GRADE 9 LEARNERS' PERCEPTIONS OF FACTORS INFLUENCING THEIR ACADEMIC PERFORMANCE IN MATHEMATICS IN TSHWANE MUNICIPALITY, SOUTH AFRICA

by

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submitted in accordance with the requirements for the degree of

DOCTOR OF EDUCATION

in the subject

PSYCHOLOGY OF EDUCATION

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: PROFESSOR REGIS CHIRESHE

OCTOBER 2020

ABSTRACT

The present study investigated Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa. The study was based on positivism paradigm. The quantitative research approach was used while the research design was a descriptive survey design. The sample was made up of 400 learners (280 females and 120 males). Convenient sampling method was employed as a result of the nature of data. A self-designed questionnaire was administered to collect data. Data were analysed using quantitative approach with the statistical package for the social sciences, version 24.0, and the few open ended data on strategies for improving learners' performance were analysed deductively. Frequency tables and ratios were calculated to establish the rating of each item. A Chi-square test was used to establish relationships of the variables on learners' Mathematics performance. The study revealed that the Grade 9 learners perceived the factors influencing their performance in Mathematics were teacher-learner relationship, school environment and influence of learners' attitude towards their performance in Mathematics, while peer relationship and home background (parents' relationship and support) were perceived as not having any relationship with learners' academic performance. The following recommendations were made to improve the Grade 9 learners' performance in Mathematics, they are: policies that may consider Mathematics as a compulsory subject in the place of maths numeracy; there should be a regular in-service training for Mathematics teachers; parents should give adequate attention and care to their children in their Mathematics assignments; there should be provision of additional classrooms and infrastructures by the government and other stakeholders; learners should be encouraged to cultivate a more positive attitude towards Mathematics as a subject. Lastly, the study proposed a model for improving Grade 9 learners' academic performance in Mathematics in Tshwane municipality, South Africa.

KEY TERMS

Academic performance, Grade 9 Learners, Learners, Mathematics, Perceptions, Tshwane Municipality.

DECLARATION

Student number: 50930427

I hereby declare that '**Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa**' is my original work and all sources that I used in the study have been indicated and acknowledged by means of complete references.

29/10/2020

SIGNATURE **DATE**

BAMIDELE SEGUN DONALD ODEYEMI

ACKNOWLEDGEMENTS

The success of this research was made possible through the meaningful contributions of important people who have been highly supportive in the course of this programme. My profound gratitude goes to God Almighty for making this degree a reality in my life and giving me sufficient grace, even when I was getting weary.

I am indeed appreciative to my supervisor, Professor Regis Chireshe, one out of many, who took time to accommodate my errors and patiently guided me to the end of this study with his invaluable experience and critical professional contributions in the development of this study, thank you sir. Special thanks to all the team of Gauteng Department of Basic Education for their unrelenting support and vital information provided to enrich this study and their timely responses. My special appreciation also goes to all the school principals and participants of the schools in the sample for their responses and immense contribution to the success of this study.

Much thanks to my friends: Dr. Rasheed Idowu, Dr. Gbenga Bodunrin, Dr. Akolade Lapite, Mr. Oni Oluwayinka, Barrister Kola Keith Oladayo, Barrister Bamisaye Olutola, Dr. Olabode Faleti, Prince Tosin Olatokun, Mr. Bolarinwa Ige, late Dr. Segun Adeyefa and late Dr. Jonathan Akinbode Akinteye of blessed memory for their contributions and supports throughout this study. I am grateful to Pastor Olumide Afolayan and Pastor Festus Adetunji for their financial support and encouragement. Thanks to the entire team of Mountain of Fire and Miracles Ministries, Pretoria Region, South Africa.

Much thanks to Professor Emmanuel Adedun, Professor Monday Ubanga, Associate Professor (Mrs.) Bola Makinde and Professor Isaac Osunmakinde for their encouragement throughout the study. I am thankful to Dr. Eniayo Sobola for editing this thesis, I am also grateful to Pa Sunday Ojuolape for his encouragement and financial support, much thanks to my uncle of inestimable value, Mr. Wole Odeyemi. I also appreciate my siblings for their moral and financial support.

So much thanks to my Parents: my father, Late Pa Jacob Adeniyi Odeyemi of blessed memory for his impact and values inculcated into my life from childhood to adulthood, his support was par excellence towards my academic success in life; my mother, Mrs Esther Adunni Odeyemi for her teachings, several pieces of advice, unrelenting encouragement and prayers throughout this study.

Finally, I am very grateful to my family, especially my wife, Mrs. Adebola Faith Odeyemi for her understanding, love, care, prayers, sacrifices and inconveniences experienced in the course of this programme. Thank you for standing by me. Much thanks to my children: Daniel, David and Deborah for their love, prayers, sacrifices, understanding, concern and encouragement throughout this study. God bless you all richly.

DEDICATION

This thesis is dedicated to the Almighty God for giving me the enabling grace for completion and to my father, Late Pa, Jacob Adeniyi Odeyemi, who had much hope and expectation in me at the commencement of this programme, but did not wait to see me achieve this dream before he passed on. I love you daddy, the best father everyone would ever dream to have.

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LIST OF ACRONYMS AND ABBREVIATIONS

ANA- Annual National Assessment

DBE- Department of Basic Education

DOE- Department of Education

HSRC- Human Sciences Research Council

MDG- Millennium Development Goals

NAEP- National Assessment Evaluation Program

OECD- Organisation of Economic Corporation and Development

PIRLS-Progress in International Reading Literacy Study

PISA- Program for International Student Assessment

SACMEQ-Southern African Consortium for the Monitoring of Education Quality

SCT-Social Cognitive Theory

SNAP- Special Needs Adapted Program

TIMSS- Trends in International Maths and Science Study

UNESCO- United Nations Educational, Scientific and Cultural Organisation

UNICEF- United Nations International Children's Emergency Fund

WEF- World Economic Forum

CHAPTER ONE: THE PROBLEM AND ITS CONTEXT

1.1 INTRODUCTION

The present study sought to establish Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa. This chapter discusses the background to the study, statement of the problem, research questions, objectives, hypotheses, rationale and the significance of the study. In this same chapter, the theoretical framework, assumptions of the study, delimitations, limitations and operational definition of terms are also discussed.

1.2 BACKGROUND TO THE STUDY

The essence of Mathematics to human society is of great importance. It is a subject of global importance. In the current economic world anchored on high technology, Mathematics education and Mathematics performance remained major assets in global competition (Kaiser, 2020:7). Adeyefa (2012:123), Yenmez et al. (2017:320) emphasise that Mathematics is a subject of necessity that evolved as a result of problems created by human interactions, ever since human beings realised the need to take stock of their possessions and value their wealth in relation to others, to the advent of performing noticeable scientific and technological feats.

Mathematics is of extreme value and importance to many countries for many different reasons. In the United States of America, it is believed that the well-being of any nation is dependent on the ability of their youth to succeed in Mathematics (Wright & Ellis, 2019:34; Holdren, 2013:2). For the rainbow nation, South Africa, (Naidoo & Ranchod, 2018:20; Simkins, 2010:1) claims that Mathematics and Science at school are core subjects that are vital to higher education, skilled jobs and the growth of the national economy. In general, (Sawatzki & Sullivan, 2018:1360; Budinski & Milinkovic, 2017:56; DeJarnette & Gonzales, 2016:36) assert that there are industries and businesses that lacked adequate personnel due to the fact that the organisations lacked people with the basic understanding of mathematical ideas, such as the ability to recognise existing mathematical relationships in an unfamiliar situation and

the ability to apply basic mathematical reasoning for developing tentative conclusions and testing their validity.

The rate of learners' poor performance and under-achievement in Mathematics has become and remained a subject of global concern over many years (Arends, Winnaar & Mosimege, 2017:1; Pisa, 2018:3). Mathematics performances of Maldivian learners in Malaysia for instance have been very poor and not encouraging all through. Records have shown from the Maldives Ministry of Education that in the National Assessment of Learning Outcomes (NALO) that took place in 2019, the learners' Mathematics result was very poor and unsatisfactory (Ministry of Education, 2019:100). The previous years have also remained very unsatisfactory and below the expected level of performance (Ministry of Education, 2012:100).

These unfavourable results have shifted the focus of researchers to finding out the reasons for the Maldivian learners' poor performance in Mathematics. Similarly, in the United States of America, among the 56 countries that took part in the (PISA) Programme for International Student Assessment, it was recorded that the American learners' class of 2009 performed poorly below the international benchmark (Hanushek & Woessmann, 2009:115). Furthermore, in the recent PISA 2018 assessment, American learners were among learners who obtained below the average benchmark (OECD, 2020:2). Moreover, in the 2019 Trends in International Maths and Science Study (TIMSS), an international test that was written globally by learners, the outcome was not that impressive. Only a few percentage of the United States Grade 4 and 8 learners passed a little above the average level of the test with a large number of learners not reaching the average benchmark of 500 marks, while a lesser percentage of the learners scored a little above average. With that, the United States is still among the poor ranking countries in Mathematics (Mullis & Martins, 2019:7).

The necessity of mathematical competence is essential to the European nations as well, despite the importance of the subject, there are still a major shipwreck among the learners in the subject (Lithner, 2011:289). In Sweden, about 20% to 30% university students still finds it

difficult to pass Mathematics in their various courses where Mathematics was required. At the same time a very few percentage of students were able to pass Mathematics, but there were clear indications that they had difficulties and they were deficient in mathematical competences despite the increasing demand for individuals with different mathematical skills (Lithner, 2011:289).

Mathematics performance among the Gambian learners have also remained a challenge to the government and stakeholders in the ministry of education (Tomita & Savrimootoo, 2016:17). The rate of Mathematics failure among learners in Liberia was also worrisome (Gbollie & Keamu, 2017:3).

The Southern African Consortium for the monitoring of Education Quality (SACMEQ) also established that Namibian learners Mathematics performance has been highly unimpressive. Namibian learners have remained behind mathematically and lacked numeracy skills as compared to other Southern African Learners (Mateya et al., 2016:158). In the South Africa universal ANA of 2014, standardised literacy and numeracy skills tests written by all learners in Grades 1 to 9 in 2013 showed the following percentages in Mathematics scores respectively according to the Human Sciences Research Council (HSRC): Grade 1: 68.4%; Grade 2: 61.8%; Grade 3: 55.4%; Grade 4: 37.3%; Grade 5: 37.3%; Grade 6: 43% and Grade 9: 10.8%. Similarly, the overall result in Mathematics for 2013 as reported in September 2014 revealed that Grade 9 learners had 14% achievement, with Grade 12 learners not improving substantially, and the total number of matriculated students in 2013 had 25.38% of achievement in Mathematics, which was indeed woeful (DoE, 2014:34). In the 2018 Programme for International Student Assessment (PISA), South African learners were also among the poorest ranked learners out of about 80 countries represented in the assessment (PISA, 2018:3). In the World Economic Forum (WEF) 2018 report, it was reported that South African learners ranked 128 out of 137 countries with 2.6% level of achievement, which was also very woeful (PISA, 2018:5). The majority of South African secondary school learners have failed to reach high proficiency level in Mathematics and Science; in comparison with other nations in the global tests, especially the Grade 9 learners which scored the poorest grade

globally (TIMSS, 2019:7; SNAP, 2017:18; TIMSS 2015:2; SNAP, 2014:31; UNICEF Education & Adolescent development, 2010:23; Mullis, Martin, Foy & Arora, 2012:255).

Mathematics performance in South Africa context has gathered attention from different educational quarters and a great concern has been shown on learners' academic performance in Mathematics. Since Mathematics is a core subject towards achieving the success for the quest of the new technological age in South Africa (Jojo, 2019: 2; Department of Education, 2008b:10), learners need to study either Mathematics or Mathematics literacy in order to get learners equipped for life and work in an ever-increasing technological and scientific driven global environment.

Having highlighted above that Mathematics is a subject of global importance, learners still have persistent failure in the subject (Arends et al., 2017:1; Pisa, 2018:3, Feza-Piyose, 2012:65). It is a general belief that poor academic performance of any learner in South Africa may inhibit the accomplishment of the South Africa technological age goals, a vision of the MDGs. DBE (2014:31) reports that Grade 9 learners had 88% of non-achievement in Mathematics, and in the preceding year, it was also revealed that 55.9% of non-achievement level was recorded in Mathematics. The 2017 TIMSS report also confirmed that South African Grade 9 learners ranked 38th position out of 39 countries, with an 87% level of non-achievement in Mathematics (Reddy, Visser, Winnaar, Arends, Juan, Prinsloo & Isdale, 2017:41).

The importance of quality education in Mathematics as a tool for nation-building has also been realised by several nations including developed countries. Many developed nations which include the United States of America discovered that their leadership roles in the world's economy and their ability to produce needed wealth and quality jobs are determined solely by the ability of the educational system to produce learners with the ability of competing globally in Mathematics and Science (Hoeg & Bencze, 2017:279). Therefore, the development of Mathematics and Science education has become a paramount issue in the agenda of the policy-making body in America (Hoeg & Bencze, 2017:279). Mathematics is viewed as a human

endeavour that makes use of scientific methods of observation, representation, investigation of patterns or events and measurable relationships present in physical and social occurrences between mathematical purposes or items. Mathematics has also been considered as an indispensable subject which is an essential tool needed in the making up of the educated man. Mathematics is also a tool necessary for the sharpening of the individual's mind; it shapes his reasoning ability and develops his personality (Chowdhury, 2016:3).

Learners' mathematical successes in Secondary Schools have influential implication on performance in College and in their future careers (Wang & Degol, 2017:122). Learners' solid background in Mathematics can help in developing sophisticated orientations and offer more career alternatives (Wang & Degol, 2017:123). The dichotomy in learners' performance in Mathematics has in recent times attracted considerable academic attention by interested and concerned stakeholders despite the introduction of different approaches applied to learning and instruction. This dichotomy has been attributed to success and failure of learners in schools. Some likely factors may be connected to the statement made above; these include self-esteem, self-efficacy, motivational orientation, study habits, emotional problems, teacher's consultation and poor interpersonal relationships among learners (Wang & Degol, 2017:122; Aremu & Sokan, 2003a:368). There are lots of factors that could also be responsible for learners' academic performance in Mathematics which could be internal and external factors. These hosts of factors may play inhibiting roles when society fails to take responsibility and when learners do not behave appropriately or fail to meet the required passing standard (Acharya, 2017:9; Ugwuanyi, Okeke & Asomugha, 2020:494).

In the report from South African Education Statistics for the year 2010, the Department of Basic Education (2012:31; 2015:3) indicates some basic facts on Mathematics education; in which a part of the facts was summarised in the sequel. In South African schools, learners' performance in Mathematics has not been impressive. This is why both the Government and the Department of Basic Education (DBE) have made it a top priority to have an improved quality at all levels of educational outcomes in the schooling system. In the face of the general

poor performance of South African learners in Mathematics, there is an urgent need for a way out (Hajovsky, Oyen, Chesnut & Curtin, 2020:111).

Based on the poor performances recorded, there is a need to know the Grade 9 learners' perceived factors influencing their academic performance in Mathematics in Tshwane municipality. Grade 9 learners are considered for this study based on the fact that a few studies have been carried out on factors that influence Grade 9 learners' Mathematics performance. It was also reiterated by the Department of Basic Education that Grade 9 learners' Mathematics performance was a weak link in Mathematics within the South African basic education system generally (DBE, 2015:22). Apart from this, Grade 9 learners are at a sensitive stage, a transitional and critical stage where learners start to choose subjects (DBE, 2015:22). These have also called for this present study which is to assess the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa.

Tshwane municipality is the smallest and the richest of all the nine provinces in South Africa. It is also the second most populous of the provinces. Tshwane municipality is the seat of the executive government and the most urbanised. This has made it attracted to a high rate of migrants from other cities and provinces with very rich information, with about the largest population (South African Cities Network, 2004:92). Tshwane municipality was chosen as the area of study for its easy accessibility and for the fact that the rate of poor performance of Tshwane learners in Mathematics is alarming, where 12% of learners achieved above 50% and 88% of learners failed woefully in the 2014 universal ANA report unlike other provinces like Western Cape which had a slightly higher percentage over Tshwane municipality learners (DBE, 2014:61). This gives room for great concern as reported in the year 2014/2015 SNAP survey (DBE, 2014:30, 32).

1.3 STATEMENT OF THE PROBLEM

The background to the study has shown that Mathematics is a core subject in the educational system of any nation, yet learners have found it difficult to understand (Yenmez et al, 2017:320; Naidoo & Ranchod, 2018:20; Simkins, 2010:1). It has also been noted that a large number of secondary school learners in South Africa had failed to reach proficiency in Mathematics and Science (Reddy et al., 2016:5, 2012:256; DOE, 2014:3; Tachie & Chireshe, 2013:67; Feza-Pisoye, 2012:65; Mullis et al., 2012:255). The background to the study also highlighted that there are some studies (Tachie & Chireshe, 2013:67; Mkgato & Mji, 2006:255; Feza-Pisoye, 2012:65) on the factors influencing learners' academic performance in Mathematics in other parts of South Africa without focusing on Tshwane municipality Grade 9 learners.

It is against this background that the study sought to answer the following major research question: What are the Grade 9 learners' perceived factors influencing their Mathematics performance in Tshwane municipality.

1.4 MAIN RESEARCH QUESTION

The present study was guided by the following research question: What are the Grade 9 learners' perceived factors influencing their academic performance in Mathematics in Tshwane municipality?

1.4.1 Sub research questions

The present study was guided by the following sub-research questions in order to establish the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa:

1.4.1.1 To what extent do Grade 9 learners perceive peer relationship is influencing their academic performance in Mathematics in Tshwane municipality?

1.4.1.2 To what extent do Grade 9 learners perceive home background is influencing their academic performance in Mathematics in Tshwane municipality?

1.4.1.3 To what extent do Grade 9 learners perceive teacher-learner relationship is influencing their academic performance in Mathematics in Tshwane municipality?

1.4.1.4 To what extent do Grade 9 learners perceive school environment is influencing their academic performance in Mathematics in Tshwane municipality?

1.4.1.5 To what extent do Grade 9 learners perceive learners' attitude is influencing their academic performance in Mathematics in Tshwane municipality?

1.4.1.6 What are the perceived strategies that can be used for improving the Grade 9 learners' academic performance in Mathematics in Tshwane municipality?

1.5 OBJECTIVES OF THE STUDY

This study sought to:

1.5.1 Establish the perceptions of Grade 9 learners on the relationship between peer relationship and their academic performance in Mathematics in Tshwane municipality.

1.5.2 Determine the perceptions of Grade 9 learners on the relationship between home background and their academic performance in Mathematics in Tshwane municipality.

1.5.3 Establish the perceptions of Grade 9 learners on the relationship between teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality.

1.5.4 Determine the perceptions of Grade 9 learners on the relationship between school environment and their academic performance in Mathematics in Tshwane municipality.

1.5.5 Establish the perceptions of Grade 9 learners on the relationship between attitude and their academic performance in Mathematics in Tshwane municipality.

1.5.6 Determine the perceived strategies and to propose a model that can be used for improving Mathematics performance of Grade 9 learners of city of Tshwane municipality.

1.6 HYPOTHESES OF THE STUDY

In an attempt to seek answers to the sub-research questions raised in the study, the following null hypotheses were tested.

1.6.1 There is no significant relationship between the Grade 9 learners' perceptions of peer relationship and their academic performance in Mathematics in Tshwane municipality.

1.6.2 There is no significant relationship between the Grade 9 learners' perceptions of home background and their academic performance in Mathematics in Tshwane municipality.

1.6.3 There is no significant relationship between the Grade 9 learners' perceptions of teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality.

1.6.4 There is no significant relationship between the Grade 9 learners' perceptions of school environment and their academic performance in Mathematics in Tshwane municipality

1.6.5 There is no significant relationship between the Grade 9 learners' perceptions of learners' attitude and their academic performance in Mathematics in Tshwane municipality.

1.7 RATIONALE FOR THE STUDY

The researcher has many years of experience as a teacher in both primary and secondary school with a lot of exposures to the difficulties encountered by learners in their performances in Mathematics. With the researchers' experience and interest in the South African education, the researcher was also exposed to the level of failure that was often recorded from Grade 9 learners' Mathematics results in South African schools in Tshwane municipality over the years.

It became a subject of concern to the researcher that there must be some perceived factors responsible for the rate of poor performance of these learners over time, and there is a need for the situation to be investigated and find out possible strategies for improvement in the subject. This situation calls for urgent attention and became a justification for this study.

1.8 SIGNIFICANCE OF THE STUDY

The present study was aimed at adding value to the domain of academic performance, particularly, secondary school learners' academic performance in Mathematics. It is believed

that the present study may be of immense benefit to government, curriculum planners, teachers, parents, learners and stakeholders.

The present study may be providing the concerned authorities and stakeholders with adequate information on how to make the teaching of Mathematics more interesting to the learners. This study may also help learners to overcome their phobia for Mathematics by providing for them the right set of values for the subject.

The present study may help in equipping teachers with the right methodology and best methods to make the teaching of Mathematics more interesting. Findings may further assist government and stakeholders to design policies to promote positive behaviour and cultivate aptitude for Mathematics in learners, lastly, contributing to the knowledge base of available literature in educational psychology on perceived factors influencing secondary learners' academic performance in Mathematics.

1.9 THEORETICAL FRAMEWORK

Social Cognitive Theory of Learning

This present study was anchored on Social Cognitive Theory of learning by Albert Bandura which is discussed below.

The Social Cognitive Theory (SCT) is concerned with the role of the environment, the influence of self-observation and self-evaluation (beliefs and perceptions), role models and self-efficacy in learning. Furthermore, the theory views individuals as self-organizing, proactive, self-reflecting and self-regulating beings.

The theoretical framework is discussed under four different but interrelated components of SCT, which are: self-observation and self-evaluation, modelling and self-efficacy (Redmond, 2010:15)

1.9.1 Self-observation and self-evaluation in Social Cognitive Theory

Self-observation makes an individual to observe himself in order to assess his or her progress towards an achievement, especially when the individual is underperforming in a task. Self-observation is also a motivating factor of oneself with an expectation of outcomes, which requires regularity and proximity. This implies that observed behaviour must be continual,

especially when the behaviour occurs (Zimmerman & Schunk, 2001:16). The outcome of the self-observation avail individuals with the will power to influence and be responsible for their own actions in order to attain specific results. Exercising restraint in personal thoughts and actions comes as a result of processes of personal agency. The human agency comes in three distinct forms: these are either independent agency, mechanically reactive agency or emergent interactive agency (Skinner, 1971:314). According to social cognitive theory, learners are agentic operators of what happens to them, and they do not just see themselves as on-lookers to internal mechanisms caused by environmental events. The individuals can feel and perceive experiences rather than simply undergoing the experiences. Individuals also put to use their sensory, motor and cerebral systems as mechanisms needed to actualise the works and objectives that make sense to them (Harré & Gillet, 1994:112). This is in relation with the way learners feel about their mathematical perception. Throughout peoples' life activities, their brain development and functioning are as a result of the human agentic action (Kolb & Whishaw, 1998:48). The agentic action makes it easier for learners to explore, manipulate and influence their environment which could be necessary for learners' perceptions of their academic performance in Mathematics. The ability of individuals to regulate their own motivation and desired goals also makes it possible for them to produce experiences needed for cognition, social, psychomotor and other skills needed for academic success (Bandura, 1986:16). . Learners as agentic actors may be able to determine how their academic performance can be improved through the means of exploring and manipulating their potential capabilities within an enabled environment in relation to the social context such as peers, teachers and parents. It is in this regard that the Social Cognitive Theory of learning has formed the basis for the present study. Furthermore, Social Cognitive Theory was adopted for this study due to its relatedness with the concept of perceptions of factors influencing academic performance within the social context of learning, Grade 9 learners are also aware that they are not performing well mathematically from their own observations and reports (DoE, 2014:34).

1.9.2 Modelling in Social Cognitive Theory

The SCT acknowledges the role of parents, peers, teachers, schools and government in fostering learners' academic performance. Positive behavioural modelling plays a vital role in learners' academic performance. Peers' interactive processes in Social Cognitive Theory are also seen as strong mechanism for effective learning, especially where there is peer acceptance and positive academic modelling (Zimmerman, 2003:10). Human behaviour is described as a reciprocal triadic relationship existing between personal, behavioural and environmental factors. Behaviour is also not seen as an attribute of internal dispositions or external elements, but both which have influences on the learner and his environment (Bandura, 2011:361). Social Cognitive Theory strongly maintained that learning takes place in a social context and most often by observation, which models a behaviour in the learners. Social Cognitive Theory also refers to the perceptions of social basis of human thoughts and the processes through which social factors interfere and influence cognitive functioning of learners (Bandura, 1986:22). In this regard, the choice of friends, activities and milieus are perceived as a function of modelling in the selected environment. The created environments are not seen as a potential to be activated. Instead, social environments and institutional components are formed through peoples' collective endeavours. The formation, preference and structure of these environments determine the nature of the reciprocal interplay among individuals' personal, behavioural and environmental factors. From similar paths of multi-causality established through self-processes, there are evidences on how the educational system functions, including the familial systems. Schools where the learners are from deprived minority background are generally believed to perform poorly in their studies; however, schools where teachers believe strongly in their collective instructional efficacy excel academically regardless of the sociodemographic characteristics of the learners (Bandura, 1997:59). With the Social Cognitive Theory, teachers and parents have the opportunity to improve learner's emotion, correct learners with poor self-perceptions and poor thinking habit, also model positive mathematical learning habits into the learners. Teachers can also improve learners' academic skills and self-regulatory engagements, also altering the classroom structure that is capable of impeding learners' academic performance through SCT. This is indicative of the fact that Tshwane Grade 9 learners' attitude may strongly be perceived as influencing academic

performance in relation to their existing environment when they do not receive a positive academic modelling. Furthermore, Grade 9 learners with positive attitude may develop interest for learning through right modelling and positive attitudes from teachers, parents, peers and the physical environment. Where the school environment, such as classroom structure is enabled, learning becomes more effective, which may result into a better academic performance. The present study fills this gap on the perceptions of factors influencing the Grade 9 learners' performance in Mathematics since all the perceived factors influencing Grade 9 learners' academic performance in Mathematics occur within the social environment. These perceived factors also have interactions with the learners within the social environment.

1.9.3 Self-efficacy in Social Cognitive Learning

Self-efficacy may be explained as a strong positive persuasion of confidence and capability in oneself. The self-regulated learner has the capability to differentiate between known skills and facts that he or she possesses (Zimmerman, 1990:7). In a similar vein, self-regulated learners on their own can identify the academic task needed to improve performance and also set goals for effective studies to achieving the task (Hadwin, Winne, Stockley, Nesbit & Woszezyna, 2001:480).The social nature of learning in Social Cognitive Theory was established and maintained that learners' self-efficacy can be influenced by several personal, contextual and social variables attributed to the human behaviour (Bandura, 1997:58). In addition, learners' personal thoughts and beliefs are perceived as having a strong influence on both learning and interpreting contextual events.

Learners' self-efficacy can influence their academic decision making and perceptions of their physical classroom interactions that may possibly promote or impede learners' participation in the learning process. Regulating behaviour as a result of outcome expectations promotes learners' choice of actions that may likely produce positive outcomes and reasonably avoid behaviour that produces negative or less favourable results (Bandura, 2001:10). The theory also explains self-regulation in learning as a self-directive process and self-beliefs that enhance learners' ability to transform their cognitive abilities into behaviour for better

academic performance (Zimmerman, 2008:168). It is expedient for learners who have self-regulated themselves to have an enduring change necessary for better Mathematics performance, since learning is a relatively permanent change in human beings and their behaviour based on experiences within a given environment. A self-regulated learner also has the opportunity to perform better academically as a result of his or her aspirations and adaptive learning methods (Zimmerman, 2008:66). There is an existing interplay between the learners' academic performance, aspirations and the activities that take place within his environment (Bandura, 2011:361). This forms a basis for the learners' regulated behaviour for learning, and this is related to the present study because Grade 9 secondary school learners are human agencies that can make decisions on their own desired academic goals which could pave ways for academic success. Grade 9 learners may also achieve better academic performance through their self-regulated behaviour and choices of peers as agentic elements. The Social Cognitive Theory underpins the present study based on the possibilities that Grade 9 learners would have been engaged in a long process of social interaction between the environment and themselves, also within the social context which includes peers, teachers, parents and their physical environment. Grade 9 learners' academic behaviour may depend on their own self-regulated process.

In Social Cognitive Theory, learning can be defined as a mental process internally formed, which may or may not be noticed in immediate behavioural change (Bandura, 1986:18). This theory is important to this study since learning among Grade 9 learners in Tshwane municipality takes place in a social environment. The features in this theory are pointers to the perceived factors influencing secondary school learners' academic performance in Mathematics.

According to the Social Cognitive Theory of learning, parental efficacy and ambitions over their children play a vital role of raising the child's educational desires and their perceptions about their academic, social and self-regulatory efficacy (Bandura, 2011:362). Children's pattern of perceived efficacy influences the child's occupational choice in relation to their aptitude for the occupation; this is an indication of the kinds of vocations or jobs they would

choose in the future. In family functioning, the socioeconomic status impact on a child's outcome is mainly determined through parental child management practices employed (Baldwin, Baldwin, Sameroff & Seifer, 1989:1243). Most poor homes in Tshwane municipality may not be able to inculcate and promote the right academic aspiration and the right self-regulatory efficacy in their children among the Grade 9 learners; this may also deny learners in this category the needed parental support. The Social Cognitive Theory is relevant to the present study because some Grade 9 learners in this study are perceived to have come from homes where their parents are low-income earners, which may influence their academic performance in Mathematics.

According to the Social Cognitive Theory, individuals have a unique strength to attain whatever heights they desired (Maasik & Solomon, 2003:20). The standard and the kind of life path individuals are exposed to will determine their level of achievement and by the nature of the societal structures their development is entrusted to. Social structures that promote generalised capabilities inculcate a rich feeling of efficacy, mould structures for opportunities, allow useful resources and may be perceived to enable autonomy which helps individuals to increase the chances of becoming what they intend to become. According to the SCT, learners who enjoy quality life paths may be perceived as capable of improving on their academic performances. Learners' family environment is also perceived as a contributory factor to a strong self-efficacy, which is instrumental to learners' intellectual competence (Maasik & Solomon, 2003:20).

In the Social Cognitive Theory, parents' beliefs and behaviour have an impact on learners' academic performance (Meggitt & Walker, 2007:194). It is believed that different parents have different ways of guiding their children. It is also a known fact that every child is the product of his environment and home background (Meggitt & Walker, 2007: 194). Therefore, learners' academic performance may be heavily influenced by factors in his or her home and environment. In the light of the current study, it may be perceived that social factors in learners' environment may have a strong influence on their academic performance. According to the SCT, it is imperative that learners who have educated parents may develop a strong self-

efficacy, have more privilege to develop a better and positive sense of academic performance through their parents' involvement and encouragement towards learning, especially in the subject, Mathematics, hence, having a positive impact on learners' academic performance in Mathematics. It is, therefore, needful to establish a link between learner's perceptions of home environment and academic performance according to the SCT.

Social Cognitive Theory explains human development as a life-long process; the process is centered upon certain transformations in the social-personal functioning of adults, including the occurrences at childhood (Baltes & Reese, 1984:518). Tshwane Grade 9 learners as human beings may experience different capabilities as a result of their psychobiologic origins and in their experiential conditions, they may be required to increase and maintain the experiences as explained in the Social Cognitive Theory.

Human development undergoes various types and forms of changes: aspirations, convictions, personal feelings, objectives and course of actions, which shape and direct behaviour. Also, an individual's thoughts and feelings affect their behaviour (Bandura, 1986:20; Bower, 1975:215, Neisser, 1976:72). These changes, expectations and beliefs may be peculiar to the Tshwane Grade 9 learners, which may form the basis for some of the factors that may be perceived as influencing their academic performances. Snyder (2006:190) explained the SCT as a treatment received by individuals on their social status and observable characteristics that people can influence their social environment before they do anything. The present study gathered a number of principles from the Social Cognitive Theory of learning that is pivotal to the explanation of Grade 9 learners' perceived factors that may be influencing their academic performance in Mathematics in Tshwane municipality.

Going by the Social Cognitive Theory of learning that informed the present study, it was explained that learners need to have a positive perception about themselves and in the observation of others; that parents, teachers and the society need to be responsible for shaping learners' life positively (Bandura, 1997:60). Tshwane Grade 9 learners' positive perception of themselves and others may go a long way in changing and forming a better attitude on their

academic performance, also the social reactions drawn by people in the environment may affect the learner's perceptions about himself and others in a way that could possibly strengthen or alter the environmental disposition which may be important for Tshwane municipality Grade 9 learners' academic performance in Mathematics. The interactive nature of learning makes the Social Cognitive Theory of learning suitable in the present study. In this study, peers, parents, teachers, school environment and learners' attitude were considered as part of the elements within the social environment. These elements within the social environment form the basis for learners' academic performance. Furthermore, this theory was found appropriate to explore the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality for its usability to propose a model for improving their Mathematics performance.

1.10 ASSUMPTIONS

The study was carried out considering the following assumptions:

1.10.1 All the respondents would cooperate during data collection.

1.10.2 Grade 9 learners performed poorly in Mathematics and Science.

1.11 LIMITATIONS TO THE STUDY

The limitations in the course of this study were mainly in the area of finance and time because the researcher works on a full-time basis. The conflict of taking up a permanent job and studying was highly demanding. Ideally, the study would have investigated Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in all South African secondary schools, but due to time, transportation, materials, finance and constraints on human resources, the study took place within Tshwane municipality of South Africa, specifically, Pretoria East, Pretoria Central, Centurion, Mamelodi, Eersterust area, Eastlyne, Laudium and Olievenhoutbosch, and only Grade 9 learners were the research participants.

1.11.1 Overcoming the limitations

In order to get over the financial challenge, the researcher applied for financial assistance under the UNISA Directorate of Student Funding for a doctoral scholarship. The application for funding was done as soon as possible and a bursary was awarded for the study. The researcher was able to overcome the time constraint by taking a leave from office so as to fully concentrate on the study.

1.12 DELIMITATIONS

The main thrust of this study was to explore the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa.

The study was conducted in Pretoria East, Pretoria Central, Centurion, Mamelodi, Eersterust area, Eastlyne, Laudium and Olievenhoutbosch. The selected areas had vital and in-depth information on the perceived factors influencing Grade 9 learners' performance in Mathematics such that the findings could be used to generalise all other regions of South Africa.

1.13 DEFINITION OF TERMS

The key terms used in this study are defined below:

1.13.1 Academic performance

Academic performance can be explained as learners' engagement in purposeful educational activities, which can be seen through satisfaction in acquiring desired knowledge, attainment of educational outcomes, post college performance including skills and competences (Martin & Elliot, 2016:223). In the present study, academic performance refers to how Grade 9 learners in Tshwane municipality schools deal with their studies and how they cope with or accomplish different tasks given to them by their teachers in order to achieve educational goals.

1.13.2 Grade 9 learners

This is a term used in describing learners who are in their ninth grade. Learners at this stage must have undergone grades 8 after graduating from grade 7, which is the primary level. In the present study, Tshwane municipality grade 9 learners are at their middle junior high school class. This class has been considered to be a crucial stage that marks the transition of learners to the higher high school, where learners are able to select their subjects (DBE, 2015:22).

1.13.3 Home background

This is a broad term in the society; it refers to circumstances and past events that help to explain how a child develops generally. Home background is the conditions and situations in the family setting which influence the child's physical, intellectual and emotional development (Muola, 2010:215). In the present study, home background refers to the parental relationship and support that the Grade 9 learners of Tshwane municipality received, which might have contributed positively or negatively to their academic performance in Mathematics.

1.13.4 Learners' attitude

According to Souza and Marcos (2010:174), attitude is an outward and visible posture of human beliefs. What an individual sees, hears, thinks and does are determined by their attitude. Attitude means individuals prevailing tendency of response to issues, either favourably or unfavourably (individuals here refer to person or group of people, institutions or events). In the present study, learners' attitude refers to Tshwane secondary school Grade 9 learners' interest and disposition towards Mathematics in the classroom or at home**.**

1.13.5 Mathematics

Mathematics is an essential tool in virtually every field of study, which includes natural science engineering, medicine, finance and social sciences. Mathematics as defined by Aristotle, is the science of quantity, where items are quantified in numbers in relation to measurement (LaTorre et al., 2011:2). In the present study, Mathematics refers to the main dependent variable and the major subject where learners have been having difficulties.

1.13.6 Perceptions

Perception is a concept of psychology and cognitive science which deals with the process of getting awareness or understanding of sensory information (Qiong, 2017:18). Perceptions are different individuals' thought about something, the idea of what it looks like and the meanings they have given to it. In the present study, perceptions refer to the ways Grade 9 learners of Tshwane municipality see, recognise and understand the factors influencing their academic performances in Mathematics.

1.13.7 Teacher-learner relationship

Relationship can be defined as a feeling; attitude or commitment an individual has towards himself with others (Forest & Mikolaitis, 1986:79). In the present study, teacher-learner relationship refers to teachers' interaction and disposition towards Grade 9 learners of Tshwane municipality in relation to teaching, which could be positively or negatively motivated.

1.13.8 Tshwane municipality

Tshwane municipality is the smallest and the richest of all the nine provinces in South Africa. It is also the second most populous of the provinces. Tshwane municipality is the seat of the executive government and the most urbanized (South African Cities Network, 2004:92). In the present study, Tshwane municipality refers to the locale of the study. The respondents in the study were mainly from the Tshwane municipality.

1.14 CHAPTER OUTLINE

The thesis has the following chapters:

Chapter One: The problem and its context

This chapter discusses the background to the study; statement of the problem; research questions; hypotheses; objectives; rationale; significance of the study; theoretical framework; assumptions; limitations; delimitations and the definition of terms.

Chapter Two: Review of related literature

This chapter reviews related literature of the present study. The literature was presented under the following sub-headings: peer relationship and academic performance, teacher-learner relationship and academic performance, home background and academic performance (parents' relationship and support), school environment and academic performance and learners' attitude and academic performance.

Chapter Three: Research methodology

This chapter discusses the research methodology. The discussion focused on research paradigm, research approach and designs, population, sample, instrumentation, reliability and validity, pilot study, procedures, data analysis and ethical considerations.

Chapter Four: Data presentation, analysis and discussion

The chapter presents the empirical data collected from the participants. The data were presented according to the objectives of the study and the findings were presented in relation to available literature.

Chapter Five: Summary, conclusion and recommendations

This chapter presents summary of findings on the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality. Conclusion and recommendations of the study are also presented in the chapter.

1.15 SUMMARY

The chapter discussed the background of the study; statement of the problem; sub-research questions; hypotheses; objectives; rationale; significance of the study; theoretical framework; assumptions; limitations; delimitations and the definition of terms. The next chapter focuses on review of related literature.

CHAPTER TWO: REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

The aim of this study was to establish the Grade 9 learners' perceptions of factors influencing their performance in Mathematics, in South Africa. In this chapter, related literature pertinent to the factors influencing secondary school learners' academic performance in Mathematics was reviewed. The literature was presented under the subheadings which were derived from the sub-research questions of the present study. The sub-headings are: peer relationship and learners' academic performance; home background and learners' academic performance; school environment and learners' academic performance, and learners' attitude and academic performance. The gaps to be filled by the present study were highlighted.

2.2. PEER RELATIONSHIP AND ACADEMIC PERFORMANCE

Positive peer relationship has been perceived as one of the factors necessary for learners' academic performance in America (Rambaran, Hopmeyer, Schwartz, Steglich, Badaly & Veenstra, 2017:525; Kirk, 2014:78). Some studies guided by Bandura's Social Cognitive Theory of learning in America established that peer relationships are catalysts to learners' academic performance among American learners. It was argued that Mathematics requires a lot of attention and seriousness, which require learners relationship with peers that are mathematically oriented and with reasonable academic interest (Van, Fuligni, Crone & Galván, 2016:63; Elicker, Englund & Sroufe, 2018:77; Llorca, Richaud & Malonda, 2017:3; Kremer & Levy, 2008:195). Evidence has been established from previous studies on the essence of peer relationships in different areas of learners' functioning. Studies (Elicker et al., 2018:77; Llorca et al., 2017:3) in America also established that learners that are liked by their peers showed higher degree of ego development; with positive behaviour and obtain positive attachment; this promotes better interactions among their friends. Considering all the behavioural components of school performance in America, positive peer relationship was found to exert positive influences on learners' academic performance (Wang & Eccles, 2012:891). Hence, there is strong relationship between peer relationship and academic performance of learners. Experiencing warm interactions among peers in the classroom promotes a healthy and comfortable climate necessary for helping learners to meet their need for relatedness among American learners (Ciani, Middleton, Summers & Sheldon, 2010:90).

American learners who have opportunities of support from each other emotionally may develop a sense of belongingness and self-worth (Wentzel, 2017:586). The present study sought to establish the Grade 9 learners' perceptions of the influence of peer relationships on their performance in Mathematics in South Africa.

American learners who experienced peer rejection may face a heightened level of anxiety. Such learners may become worried over being teased and rejected or left out, and this will definitely interfere with their classroom concentration thereby resulting into impediments in acquisition and retention in learners (Sentse, Prinzie & Salmivalli, 2017:1015). Similarly, American learners who are rejected lack adequate peer interaction and positive peer relationship, and as a result, develop poor social and academic behaviour in the future, which may lead to failure or dropping out of school (Rubin, Bukowski & Parker, 2006:573; Wentzel, 2017:586). Peer victimization and rejection in school was also seen as a predictor of academic problems among American learners. The present study sought to establish whether victimization and rejection in peer relationship is perceived as influencing the city of Tshwane municipality Grade 9 Learners' performance in Mathematics in South Africa. Children who enjoy positive relationships with their peers may also tend to be engaged and excel better in academic tasks more than those who may have peer relationship problems.

A study by Zimmerman (2003:13) among European learners investigated the peer effects of roommates' verbal ability on their academic outcomes, using Students' Achievement Test (SAT) to find out if it varies with learners own SAT. The study revealed that roommates who had 15% in the verbal SAT scores have a negative correlation for all the learners while learners that were with roommates whose total SAT is in the middle 70% had a significant correlation on the learners. This was an indication that peer relationship was perceived as having an influence on learners' academic performance. Similarly, a study by Sacerdote (2001:686), using random pairing of roommates revealed that there is a relationship between interaction of roommates and performance. This implies that matching a high achieving learner with a low rather than middle performing learner would increase learners' overall performance. Studies conducted among Deutsche learners (Ammermueller & Pischke, 2009:318;

Beiswenger & Grolnick, 2010:370; Deci, La Guardia, Moller, Scheiner & Ryan, 2006:318) revealed that there was a positive correlation between peer relationship and academic performance among Deutsche learners. Studies in Britain established that there is a relationship between peer relationship and academic performance though peers are not independently supportive like their teachers (Darling-Hammond, Flook, Cook-Harvey, Barron & Osher, 2020:112). However, studies have also shown that when peers understand one another through positive relationship, they can promote autonomy for each other towards their academic performance (Ruzek, Hafen, Allen, Gregory, Mikami & Pianta, 2016:98). Similarly, it was established that European learners benefit from being around the high achieving peers as far as academic performance is concerned (Zimmerman, 2003:13; Sacerdote, 2001:686). The literature on the existing peer relationship among the European learners confirms the Social Cognitive Theory guiding this study. The theory states that peers' interactive processes are strong mechanism for effective learning among peers who are accepted by others (Zimmerman, 2003:10). Hence, there is a strong relationship between peer relationship and academic performance of learners. The present study sought to establish whether the situation in Europe presented above is perceived as influencing the city of Tshwane municipality Grade 9 Learners' performance in Mathematics in South Africa.

Chen, Chang and He (2003:718) showed that peer orientation among Chinese children had an impact on learners' academic performance. Similarly, in South Korea, (Kang, 2007:470) established that peer relationship was found to be a mediating factor between learners and academic performance. Furthermore, studies (Kadir, Atmowasdoyo & Salija, 2018:78) in Asia shows that peer relationship influences and boost learners' anxiety on their academic activities both at school and at home. There is a strong relationship within the group and the peers are co-related with each other. The present study sought to establish the Grade 9 learners' perceptions of the influence of peer relationships on their performance in Mathematics in South Africa.

Some Nigerian studies (Temitope & Ogunsakin, 2015:324; Olalekan, 2016:35) revealed that negative peer relationship influences peer members negatively. Similarly, Nigerian learners who get a positive support from their peers excel and concentrate more on their studies for

better academic performance (Olalekan, 2016:35; Bankole & Ogunsakin, 2016:83). In a similar vein, one of the major keys to achieving high-quality peer relationships and highly functional interaction for learning in Nigeria is getting friendly support from peers (Filade, Uwaoma, Anwanane & Nwangburuka, 2019:83). When learners are adequately monitored in the choice of peers, it is perceived as a stronghold of positive outcome on their academic performance among Nigerian learners (Wilson, 2016:36).

A Kenyan experimental study by Duflo, Dupas and Kremer (2009:321) where tracking and non-tracking of schools were randomly done revealed a positive influence on learners' academic performance among learners that were randomly paired with peers that were academically stronger in the non-tracking schools. The result, when compared, showed that learners in tracking schools scored better in exams after 18 months than learners in non-tracking schools. The result also revealed a positive direct effect of peers' quality and an indirect effect as a result of teachers' behaviour. The current study is not an experimental study, but a survey research. Experimental research may be prone to human error which may affect the accuracy of the results and the results may not be generalised to real life situations unlike survey research (Polit & Hungler, 2009:179). The current study did not make use of tracking and non-tracking schools, but the regular schools in Tshwane municipality secondary schools in South Africa.

A study on black South African learners established that peers can encourage a member of the group against his personal wish, showing an influence of peer relationship on peer members (Ryan, 2002:103). Owing to the fact that peers have a strong network of interaction with each other, spend time together and engage in activities together, it may make it easier for them to prevail over each other, either positively or negatively which has a chance of influencing learners' academic performance. Brown and Klute (2003:428) also argued that some South African peers have a strong bound of interaction and togetherness capable of influencing their academic performance.

Learners who desired a better class performance prefers to relate with peers who care and share academic interest with the academically capable peers rather than peers with little or no interest in learning activities (Landau, 2002:134). Positive role models are perceived as sources of motivation among South African peers (Santrock, 2014:319; Buhs, Ladd & Herald, 2006:4). The studies above confirm the viability of SCT which informed the study. The theory states that behaviour modelling is a critical context capable of influencing learners' academic performance. The present study sought to establish the Grade 9 learners' perceptions of the influence of modelling in peer relationship on their performance in Mathematics in South Africa.

Peer relationships have also been seen not to positively affect academic performance. Examples of such studies are in Europe (Roiki, 2019:5), America (Ryan, 2015:114; Kirk, 2014:78; Angrist, 2014:105), Tanzania (Mosha, 2017:19) and South Africa (Bosman & Schulze, 2018:2). These studies findings showed that peer relationship was not a strong factor that can influence learners' academic performance. Furthermore, it was found that older learners most times do not discuss their academic performance scores with their friends.

Some studies on peer relationship also perceived that learners were more likely to handle their academic task without the interference of peers (Roiki, 2019:5). Furthermore, most peers are able to motivate themselves for better academic performance through independent learning (Bosman & Schulze, 2018:2). The present study focused on the perceptions of how peer relationship influences Grade 9 Learners' academic performance in Mathematics in South Africa.

The literature reviewed revealed the extent of influence of the perceptions of peer relationship and academic performance. The next session discusses home background and academic performance of Tshwane municipality Grade 9 Learners in Mathematics.

2.3 HOME BACKGROUND AND ACADEMIC PERFORMANCE

Home background is the bedrock of learners' psychosocial, moral and spiritual foundation (Uwaifo, 2008:122). The influence of home background on learners' academic performance

is crucial. This has made parental support in the home environment a source of influence on learners' academic performance. The nature of parental support and relationship with learners in the home background has been of a great concern to every educator globally (Jeynes, 2017:883; Uwaifo, 2008:122). A number of studies for example, in America (Ravitch, 2016:87; Jeynes, 2012:718, 2017:885), Canada (Deslandes, Barma & Morin, 2015:135; Kreider & Suizzo, 2009:12; Codjoe, 2007:45; Murphy, 2009:95), India (Radhika, 2019:31; Kudari, 2016:32), Ghana (Wolf & McCoy, 2019:263), Liberia (Levey, Oppenheim, Lange, Plasky, Harris, Lekpeh, Kekulah, Henderson & Borba, 2017:13), Nigeria (Adetayo & Kiadese, 2011:22; Uwaifo, 2008:122; Odeyemi, 2019:24), Kenya (Ogola, Maithya & Makungu, 2018:102; Moula, 2010:214; Muleyi, 2008:10) and South Africa (Adesokan & Makura, 2020:1943; Mudau, Nkube & Mukansi, 2018:11730; Karande & Kulkarni, 2005:961; Voorhis, 2003:325), Zimbabwe (Tawodzera & Themane, 2019:11) focused on parental support and found that parental support had a positive and significant relationship with learners' academic outcomes. The details of the above studies will be discussed in the following paragraphs.

Studies in America, (Jeynes, 2012:718, 2017:885) established that academic performance of learners whose parents were graduates was perceived better than learners whose parents were non-graduates. Educated parents in America who take time to guide their children on day to day academic assignments can influence learner's educational outcomes (Stevenson & Baker, 2012:1356). Learners who enjoy good home background relationship in the United States of America were perceived to get their needs met by their parents; hence, they perform better academically (Lacour & Tissington, 2011:522). The present study sought to establish the Grade 9 learners' perceptions of the influence of supportive home environment and parental support in home background on their academic performance in Mathematics in the city of Tshwane municipality, South Africa.

European studies in Germany (Niklas, Tayler & Schneider, 2015:79, 2016:55) found that when parents are supportive in the home-based literacy activities (HBLA) with their children more frequently, the impact on a child's academic outcomes are perceived to be greater. A similar study among Australian learners on tutoring at home and parental support on academic

performance was conducted by Erions (2006:85) across 37 studies. From the studies, a positive relationship was established between parental support through tutoring and learners' academic performance.

A number of Asian studies have identified the significant role and importance of parental support in learners' academic activities at homes, the studies established a positive correlation on parental support in home background relationships: examples are China (Li & Qiu, 2018:91; Hill & Chao, 2009:229) and Pakistan (Kazmi, Sajjid & Pervez, 2011:420) on the relationship existing between parents' education and support on learners' academic performance. The studies revealed that parental support was significantly related with learners' academic performance. Parents' supportive role is operative for the growth and development of their children academically (Kudari, 2016:32). Children communicate their encounter and challenges at school regarding their academics to their parents, because their parents are seen as a major source of their security, encouragement and role model who proffer solutions to their problems (Radhika, 2019:31). This is an indication that when both the father and the mother are supportive in their children's education, it is perceived that there could be a better performance on the part of the learners; also, supportive parents can bring out the academic quality in their children to the fore. The importance of the family was established by the SCT which informed the present study. The theory states that the family is the child's immediate source of learning. The present study sought to establish the Grade 9 learners' perceptions of the influence of supportive home environment and parental support in home background on their performance in Mathematics, in South Africa.

Similar studies in Nigeria established that Nigerian learners who have parents that are educated have a better platform and opportunity of being a higher academic achievers (Adekola, 2012:281; Uwaifo, 2008:122). This may be as a result of the motivation, support and encouragement they have received from their parents; giving such learners an edge over the other learners who have uneducated parents. This is also an indication that educated parents are most times sensitive to their children's educational needs and demands. Uwaifo (2008:122) further revealed that the home environment and how the family meets the needs

of Nigerian learners have a significant influence on their academic performance. This cited study investigated on university students, while the present study focused on South African secondary school learners. In a similar vein, an empirical study in Nigeria on secondary school students on single-parenthood and academic performance revealed that when a child's need is not promptly taken care of, the child develops some psychological disturbances capable of inhibiting better academic performance (Odeyemi, 2019:24). These studies above confirm the SCT which informed the present study. The theory states that learners are products of their homes.

The home background was revealed as the source of provision for Zimbabwean learner's basic needs, but in a situation where the family cannot afford the provision of those basic needs, learners may be faced with challenges in meeting up with their academic demands (Bonga, 2010:2; Chinyoka & Ganga, 2010:156; Moyo, 2011:48). It is also possible that learners from a poor home background may have to struggle a lot to meet up with academic tasks. That is why in most cases such learners' contribution and attention during class lessons may not be encouraging and sometimes passive (OECD, 2011:40). It was also established among Kenyan learners that parental support was related to academic performance (Ferlazzo, 2015:35; Moula, 2010:214).

In relation to the preceding paragraph, home background plays a vital and significant role in the life and education of South African learners (Page, 2016:24). South African studies (George & Adu, 2018:140; Dearing, Kreider, Simpkins & Weiss, 2006:655; Mji & Makgato, 2006:258; Mji & Mbinda, 2005:245) revealed that home background relationship where parents are supportive in learners' education have been identified as a means by which demographic gaps in learners' performances are closed in order to maximize learners' potentials. It was further established that most educated parents, especially the mothers are mostly concerned about their children's education and make sure that they are given a positive orientation necessary for a high academic performance (Mathias, 2009:5; Topor, Keane, Shelton & Calkins, 2010:190). In addition, (Ntekane, 2018:2; Kwatubana & Makhalemele, 2015:315) established that educated parents in South Africa most times make room for

relationship with their children's teachers in order to provide necessary additional reinforcement to encourage learners' academic performance. It was also established that South African learners whose parents have strong value for science were perceived capable of performing better in Mathematics and sciences (Perera, Bomhoff & Lee, 2014:250). These studies above confirm the SCT that informs the present study. The theory states that parental efficacy and aspirations play a vital role of raising the educational aspirations of their children and their sense of academic and self-regulatory efficacy (Baldwin et al., 1989:1243). The present study sought to establish the Tshwane municipality Grade 9 learners' perceptions of the influence of parents' home background relationship, especially their education on their (learners) performance in Mathematics, in South Africa.

Several learners living in a single-parent household across the globe may have challenges with their academic pursuits (Odeyemi, 2019:24; UNESCO, 2003:144). For example, in South Africa (Adesokan & Makura, 2020:1943; Mudau et al., 2018:11730), in Kenya (Ogola, et al., 2018:102), in Zimbabwe (Tawodzera & Themane, 2019:11), in Ghana (Wolf & McCoy, 2019:263), in Liberia (Levey et al., 2017:13). It was established that learners from single-parent homes experience challenges in their academic pursuits. The present study sought to establish if the Tshwane municipality Grade 9 learners perceive the situation above as influencing their performances in Mathematics, in South Africa.

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Home background and parental support have also been seen not to positively affect academic performance. Examples of such studies are in America (Marschall & Shah, 2016:56), Kenya (Muola, 2010:215), Nigeria (Alade & Idowu, 2017:7) and South Africa (Mattingly et al., 2015:552; El Nokali, Bachman & Votruba-Drazl, 2010: 990). These studies findings show that home background relationship was not a strong factor that can influence learners' academic performance. In a similar development, it was also found that there are many learners without parental support, yet they still excel academically in America (Marschall & Shah, 2016:56). The present study focused on home background relationship on the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics, in South Africa.

The literature reviewed revealed the extent of influence of the perceptions of the home background relationship on learners' academic performance. Parental support is crucial to academic performance; however, teachers also have roles to play in achieving this; hence, there is a need to study the influence of teacher-learner relationship on learners' performance.

The next section discusses the teacher-learner relationship and academic performance.

2.4 TEACHER-LEARNER RELATIONSHIP AND ACADEMIC PERFORMANCE

Teachers are the propelling force and main resource in the drive towards learners' development and academic growth, the gateway to knowledge and agents of change (Murphy, Redding & Twyman, 2016:11; Wallace, 2011:19). There are studies in America (Jia, Konold, & Cornell, 2016:298; Ruzek, Hafen, Allen, Gregory, Mikami & Pianta, 2016:95; Steveson, Hedberg, O'Sullivan & Howe, 2016:820) that have shown strong evidences that teacher-learner relationship is perceived as critically fundamental to learners' healthy academic development at school. Cantor, Osher, Berg, Steyer and Rose (2018:5) also established in America that achieving a better academic performance depends on teachers' ability to put learners' background, emotional needs and relationships into consideration. Positive teacher-learner relationship may also be perceived as a recipe for safety for vulnerable learners at the risk of failure.

Teacher-learner relationship can change from time to time, as learners grow older and the connection between teachers and learners in school settings remains a strong link from the preschool level to the last grade in school (Steveson et al., 2016:820). Middle school learners who lack bonds with their teacher may likely disengage from school or have a feeling of being alienated from school (Gehlbach, Brinkworth, King, Hsu, McIntyre & Rogers, 2016:346). The present study sought to establish if the American situation above is perceived as influencing city of Tshwane municipality Grade 9 learners.

Among the Slovene learners, in Europe, how learners perceive their Mathematics teachers' relationship, support and availability goes a long way in their performance and has a significant influence on their motivation and performance in Mathematics (Levpuscek & Zupanic, 2009:543). Learners may see their teachers as mentors and potential role models whose behaviours can be easily emulated. The likes and dislikes of teachers have a strong effect on learners. Unfortunately, many teachers do not realise that the way they teach, behave and interact with learners can be more paramount than the subject or topics taught (Carter & Darling- Hammond, 2016:595; Yara, 2009:366). This demands a responsibility from teachers to be conscious of their relationship with learners in order to achieve positive interest from learners towards Mathematics. The study above confirms the Social Cognitive Theory of learning guiding the present study. The theory states that teachers are role models through their relationship with learners. The present study sought to establish the Grade 9 learners' perceptions of mentoring in teacher-learner relationship on their academic performance in Mathematics, in South Africa.

Studies in Asia, Singapore (Sfard, 2016:43; Kaur, Tay, Toh, Leong & Lee, 2018:105) established that teacher-learner relationship was perceived to have a strong influence on learners' academic performance. Singaporean learners who were treated with respect and value by their teachers display a high sense of interest and dedication to hard work which is necessary for academic success. In a similar trend, Chinese learners who were cared for by their teachers were able to improve on their academic performance (Lei, Cui & Chiu, 2018:1; Longobardi, Prino, Marengo & Settanmi, 2016:994).

Adu and Oladuntun (2007:59) established teachers' relationship as a strong determinant of learners' performance in Nigerian secondary schools. Similarly, Yara (2009:365) revealed that Nigerian teachers who have cordial relationship with their learners could help the learners to develop acceptable behaviour towards Mathematics. Where teacher-learner relationship is positive, learners' performances may be enhanced. In the light of the above discussion, quality teacher-learner relationship may be responsible for a higher level of academic excellence. The

present study sought to establish if the Nigerian situation above is perceived as applicable to city of Tshwane municipality Grade 9 learners.

Kenyan studies (Waseka & Simatwa, 2016:73; Ochieng, Kiplagat & Nyongesa, 2017:45) revealed that Kenyan teachers' relationship with learners influence learners' academic performance. Similarly, in Botswana, it was also established that schools need a generation of teachers whose aim and intention is to go beyond teaching of learners, but to develop cordial relationship with learners which is capable of making learners to become independent and also building a life-long interest and motivation necessary for becoming autonomous learners (Maniraho & Mugabo, 2019:18; Maniraho, 2017:38). The studies above confirm the SCT that informed the present study. The theory states that, cordial teacher-learner relationship is considered very important to learning. The theory also maintained that learners' academic performance can be achieved when teachers' beliefs are shaped through collective efficacy to encourage and educate the learners through cordial teacher-learner relationships (Bandura, 1997:59).

Teacher-learner relationships have been perceived as the essential catalysts for school improvement in South Africa (George & Adu, 2018:140). South African teachers have also been described as the 'midwives' of the educational and economic system (Woolfolk, 2010:76). Similarly, South African teachers are expected to motivate learners who lack necessary support from home; also, it is easier for learners to be motivated at the elementary classroom stages due to the fact that learners at middle and high school have more concrete attitudes (Maniraho & Mugabo, 2019:18; Manzo, 2008:23, Wolhuter & Van Staden, 2008:110). In relation to the above paragraph, the present study sought to establish the Grade 9 learners' perceptions of the influence of teacher-learner relationship on their academic performance in Mathematics, in South Africa.

Generally, teachers may find themselves in the position of parents when learners are at school, thereby increasing the teacher-learner relationship in the school; this is called loco parentis, on the basis of the fact that learners spend more time at schools than their homes (Roos,

Oosthuizen & Smit, 2009:126). Studies in America (Currin, 2019:25; Davis, 2020:164), Europe (Rushidi & Rushidi-Rexhepi, 2015:115), Asia (Hamad, 2018:40; Kirovska-Simjanoska, 2015:34) and Nigeria (Mafukata, 2016:33; Nakpodia, 2009:12) have revealed that teachers' loco parentis status has been recognised in schools and academic settings, making room for increased teacher-learner relationship, which in turn influences learners' performance. In South African context, in relation to teacher-learner relationship, teachers are expected to discharge their responsibilities towards the learners during school hours just as the parents of the learners (Tshatshu, 2016:56; Potgieter, 2007:857). Rapeta and Magano (2017:248) emphasised that South African teachers have the responsibility of taking care of the learners under them. The loco parentis status underscores several vital areas in respect of teacher-learner relationships; this implies that teachers should help the learners by giving meanings to their own world in the society (Rapeta & Magano, 2017:248). Teachers should also lead and guide learners by opening them up to new ideas and equipping them towards a meaningful academic success to adulthood (Chirinda & Barmby, 2018:117; Ekdahl, Venkat, Runesson & Askew, 2018:5). The present study sought to establish the Grade 9 learners' perceptions of the influence of teachers' loco parentis status in teacher-learner relationship on their academic performance in Mathematics in South Africa.

It is a general believe in America (Pianta et al., 2012:375; Ruzek et al., 2016:95), Europe (Ladd et al., 2015:330; Juvone et al., 2012:393), Nigeria (Yara, 2009:365; Mafukata, 2016:32) and South Africa (Higgs, 2016:95; Cherrington & De Lange, 2016:375) that in every relationship of trust, positive educative learning experience can be achieved and where trust in the relationship between teachers and learners is lacking, the purpose of the relationship is defeated. Therefore, it is expedient for favourable teacher-learner relationship to be established in the classroom. Learner's sense of belongingness to school is achieved when teachers show concerted effort of warm reception and support for learners' academic activities (Orlando, 2013:213; Onyia, 2010:121). Optimal structure requires that teachers must be able to build trust in the learner's abilities, as well as assisting the learners to work out ways of attaining high levels of understanding and performance in the subject (Dweck, 2017:132; Osher, Kindron, Brackett, Dymnicki & Weissberg, 2016:646). The present study sought to

establish the Grade 9 learners' perceptions of the influence of trust in teacher-learner relationship on their academic performance in Mathematics, in South Africa.

There are some literature, for example, in America (Kim et al., 2018:4; Rivkin et al., 2005:12) which indicate that the correlation between teacher-learner relationship and academic performance in Mathematics is perceived to be rather weak and cannot be considered to be of serious significance.

Furthermore, the findings of these studies on teacher-learner relationship showed that there has never been an agreement on the exact teacher-learner factors that influence learners' academic performance. Learners' academic performance was also perceived not related to teacher-learner relationship (Kim et al., 2018:4; Rivkin et al., 2005:12).

Supportive teachers' relationship is an important key to effective learning, but without an enabled school environment, the effect may be ineffective; hence, there is a need to study the influence of school environment and academic performance. The next section presented the influence of school environment on academic performance.

2.5 SCHOOL ENVIRONMENT AND ACADEMIC PERFORMANCE

The learners' classroom environment is an integral part of their learning process and both learners and teachers are affected by the classroom environment, since it serves as the platform for learning activities within the school environment (Richardson & Mishra, 2018:46; Danielsen, Wiium, Wilhelmsen & Wold, 2010:256). Several scholars have done some studies on the influence of school environment on learners' academic performance; examples of such studies are in America (Byoung-Suk, Ellis, Junga & Jacobs, 2017:36; Benbenishty, Astor, Roziner, Stephani & Wrabel, 2016:188; Caskey, Cerna, Hanson, Polik & Houten, 2016:106; Healthy Schools Network, 2013:5; Shindler, Jones, Williams, Taylor & Cardenas, 2009:64), Canada (Roberts, Edgerton & Peter, 2008:405), Europe (Murugan, 2013:302; Shadrek, 2012:415; Cohen, Pickeral & McCloskey, 2009:46), India (Kudari, 2016:34), Nigeria (Jacob, Olawuyi & Jacob, 2016:10; Oselumese, Omoike & Andrew, 2016:12; Idowu & Oluwole, 2014:102; Omotere, 2013:45), Uganda (Verspoor, 2006:276), Tanzania (Semali, Vumilia &

Philbert, 2016:54; Wilson, 2011:132), Somalia (Kekare, 2015:4), Kenya (Mbugua, Kibet, Muthaa & Nkonke, 2012:88; Otieno & Yara, 2010:127), Botswana (Maniraho, 2017:38) and South Africa (George & Adu, 2018:138; Marais, 2016:56). The details of the above studies will be discussed in the following paragraphs.

Byoung-Suk et al. (2017:36) established that a conducive school environment was seen as a necessity for effective learning in education in America. It was established that American learners' academic performance can be significantly moulded in high-risk urban environments where a positive, supportive and culturally conscious school environment exists (Roberts, Edgerton & Peters, 2008:405; Healthy Schools Network, 2013:5). Similarly, in Canada, Roberts et al. (2008:405) established that enabled school and classroom environment are vital to learners' academic performance. The studies above confirm the SCT which informs the present study. The theory states that individuals learn from their social environment, which must be enabled for effective learning (Bandura, 1986:18). Therefore, learners' performance in Mathematics may be positively influenced within an enhanced environment that is conducive enough for learning activities.

Benbenishty et al. (2016:188) established that the quality of the classroom environment in any European school is perceived as a significant determinant of learners' learning outcomes. Also, learners have the capacity of learning and performing better when they have a positive perception of their classroom environment and could also perform worse when they have a negative perception about the learning environment (Murugan, 2013:302; Shadrek, 2012:415; Cohen, Pickeral & McCloskey, 2009:46). Hence, the school learning environment has become a subject of major concern in teaching and learning process (Shadrek, 2012b:415). Safe and supportive collaborative learning environment enhances learners' morale and retention rate; teachers also enjoy a higher degree of job satisfaction (Murugan, 2013:302). When various characteristics of school and classroom climate are linked together, a fabric of support that allows the members of the school community to learn and to teach optimally is created (Benbenishty et al., 2016:188). The present study sought to establish the Grade 9 learners'

perceptions of the influence of quality classroom environment on their academic performance in Mathematics in South Africa.

Kudari (2016:33) emphasised the importance of the classroom environment among Asian learners when he stated that the classroom environment must be put in order to enhance better teaching and learning situation. This implies that the classroom situation in the school environment is significant to learners' academic performance. Studies in Tunisia (Khalil & Saar, 2009:144), Egypt (Yilmaz, 2009:38) and Libya (Khalil & Saar, 2019:48) revealed that a positive school climate promotes learners' academic performance in Mathematics and sciences. In the Arabian learning environment, classroom partitions in the school can also be explained as a display or range of inner features that differentiate each classroom in the school environment, which could influence teachers' and learners' behaviour (Khalil & Saar, 2009:144). As a result, learners' performance and behaviours may be influenced by factors existing within the classroom in the school environment. Study among the Bhutanese learners established that classroom environment is central to effective learning (Tshewang, Chandra & Yeh, 2017:280). The condition of learners' school environment has drawn the attention of researchers to the importance of the learners' perceptions about their learning environment. The present study sought to establish the Grade 9 learners' perceptions of the influence of quality school environment on their academic performance in Mathematics, in South Africa.

Classrooms with too many learners in Nigerian secondary schools can be disruptive to learning and education as a whole (Jacob et al., 2016:10; Oselumese et al., 2016:12; Idowu & Oluwole, 2014:102). Similarly, Odeh et al. (2015:4918) established that Nigerian learners' school environment design, school climate, discipline and physical facilities has a significant influence on learners' academic performance in Zone 'A' Senatorial District of Benue State. A similar earlier study that was also conducted in Nigeria by Omotere (2013:45) to examine the influence of school environment on Lagos State secondary school learners' academic performance shows that school environment influences learners' academic performance. The present study sought to establish if the school environment situations discussed above has an

effect on the Grade 9 learners' perceptions of their school environment on their academic performance in Mathematics, in South Africa.

A Somalia study of grade 11 learners by Kekare (2015:4) on the relationship between school classroom environment and academic performance established a correlation between school classroom environment and academic performance of learners. On the other hand, a Kenyan study conducted in the Baringo County by Mbugua et al. (2012:88) on learners' school environment among secondary schools showed that school environment is a predictor of academic performance. A similar Kenyan study further revealed that most schools in Kenya lacked proper physical facilities, environment and textbooks needed for effective teaching and learning of Mathematics (Othoo, Olel & Gogo, 2019:395). The present study sought to establish if school environment is perceived as influencing Tshwane municipality Grade 9 learners' performance in Mathematics as is the situation in Somali and Kenya presented above.

South African studies on learners in Limpopo established that many schools still have poor and dilapidated physical infrastructures, including the classrooms (Department of Basic Education, 2018:12; Madsen, 2016:201). This poor school environment makes learners unsafe and vulnerable. Often times, these schools lack potable water in the school compound. The poor school condition tends to inhibit teaching and learning tasks in the school, which could also remain as a threat to the health of learners and educators. For learners to be motivated to exhibit better academic and mathematical skills, school environments must be creatively positioned (George & Adu, 2018:138). Where this is not achieved, such situation could lead to absenteeism among learners and educators; hence, there is a strong relationship between learners' performance and the school facilities available to learners (Madsen, 2016:201). The present study sought to establish Grade 9 learners' perceptions of the influence of school environment on their academic performance in Mathematics, in South Africa.

School environment have also been seen not to positively affect learners' academic performance. Examples of such observations are in America (George et al., 2018:323; Fredricks, Filsecker & Lawson, 2016:2; Lawson & Masyn, 2015:68) and China (George et al.,

2018:325) where it was found out that school environment was not a strong factor that can influence learners' academic performance.

It was further established among the Chinese learners that, despite the existence of many schools that may be adequately furnished, yet learners do not perform better academically than those learners in some poor school environment (George et al., 2018:325). Furthermore, it was established among the American learners that, academic performance was seen as a product of active academic engagement, which is more critical to performance than the school environment (George et al., 2018:323; Fredricks, Filsecker, & Lawson, 2016:2; Lawson & Masyn, 2015:68). The present study is focused on the Grade 9 learners' perceptions of the school environment on their academic performance in Mathematics, in South Africa.

The literature reviewed revealed the importance of school environment and that a good learning environment is essential for learning and academic performance. However, a good school environment may not enhance learners' academic performance without the right attitude from the learners; hence, there is a need to study the learners' attitude.
The next section discusses learners' attitude and academic performance.

2.6 LEARNERS' ATTITUDE AND ACADEMIC PERFORMANCE

Learners' attitude regarding Mathematics performance has been considered as a significant factor necessary for school performance and experience (Middleton, Jansen & Goldin, 2017: 669). Several studies on learners' attitude in Mathematics showed a strong degree in the importance of learners' attitude towards academic performance in Mathematics. Studies in America (George & Adu, 2018:137; Jacoby-Senghor, Sinclair & Shelton, 2016:51; Bowen & McPherson, 2016:85); Canada (Bandura, 2007:3); Asia (Radhika, 2019:31; Mohd, Mahmood & Ismail, 2011:51; Maat & Zakaria, 2010:17; Tahar, Ismail, Zamani & Adnan, 2010:476; Yee, 2010:681); Europe (Bramlett & Herron, 2009:44; Papanastasiou, 2008:26; Manoah, Indoshi & Othuon, 2011:965; Kogce, Yıldız, Aydın & Altındag, 2009:291); Nigeria (Serin & Mohammadzadeh, 2008:67; Bassey, Umoren & Udida, 2008:49; Oluwatelure & Oloruntegbe,

2010:102); Ghana (Mensah, Okyere & Kuranchie, 2013:134) and South Africa (Buhagiar, 2013:68; Kayander & Rammala, 2009:19) points out that learners' attitude is perceived as a determinant of a better academic performance. The details of the above studies will be discussed in the following paragraphs.

Schonfeld (2008:100) revealed that Grades 10 to12 American learners perceived that Mathematics is difficult for them to learn as compared to other subjects. Similarly, a longitudinal study of American learners by George (2006:573) revealed that the overall trend for learners' attitudes about the utility of science was positive; however, learners' attitude towards science declined over the middle school and high school years. The study established that the most important time-varying predictors of both attitudes were poor science self-concept, peer attitudes and learners' poor participation in Mathematics and science related activities. The current study is not a longitudinal study, but a descriptive survey because longitudinal study requires a huge amount of time, expensive and the risk of gathering data which may make the result unreliable and inconsistent. In a similar trend, studies on learners' attitude conducted by Lukowski, Ditrapani, Jeon, Wang, Schenker and Doran (2016:56) established that American learners' attitude toward Mathematics performance includes Mathematics anxiety which has been linked with poor attitude from the learners. Learners' negative attitude may be perceived as a hitch to learners' Mathematics performance among secondary school learners (Gunderson, Sorhagen, Gripshover, Dweck, Goldin-Meadow & Levine, 2017:103; Park, Gunderson, Tsukayama, Levine & Beilock, 2016:310). Jankowski (2017:211) also contends that American learners must develop positive attitude towards problem solving in order for them to succeed mathematically. American learners who lacked motivation were also perceived to develop negative attitude towards academic performance in Mathematics while the well-motivated learners performed excellently in their school works and earn good grades in Mathematics due to their positive attitude (Boechnke, 2018:150; Uzezi & Deva, 2017:352). Learners' negative attitude towards Mathematics has been perceived as having an influence on the academic performances of the American learners in Mathematics (Jankowski, 2017:211; Lukowski et al., 2016:56). The present study sought to

establish the influence of attitude on the city of Tshwane municipality Grade 9 Learners' academic performance in Mathematics, in South Africa.

Studies on Mathematics performance in Australia and Britain have consistently focused on learners' attitude towards Mathematics as a subject and established that attitude affects learners' academic performance (Cunha, Heckman & Schennach, 2010:310). Hassan (2008:129) also conducted a comparative study among Australian tertiary students and secondary learners on the influence of learners' attitude towards Mathematics performance, and it revealed that learners' attitude towards Mathematics performance changes positively as soon as they transit into the tertiary level while a few secondary learners showed poor attitude towards Mathematics performance. It was further established that motivated European learners may display moderate and acceptable attitude in classroom works; may work hard for higher grades; be more attentive in class; seek additional information in respect of the subject, and make positive attempt to overcome difficulties (Stafford-Brizard, 2016:19). In the light of the above discussion, the present study sought to establish if Grade 9 Learners from Tshwane would perceive learners' attitude as influencing their performance in Mathematics as is the situation in Europe presented above.

Attitude has been established as a strong predictor of learners' academic performance in Mathematics among Asian learners (Radhika, 2019:31; Tinio, 2009:72; Tezer & Karasel, 2010:5808; Tahar, Ismail, Zamani & Adnan, 2010:476). Radhika (2019:32) established that Asian learners with high degree of unrelenting effort and perseverance for Mathematics will not stop trying or give up on the subject until they get the right answers in the subject. This is an indication that learners who lack patience may not be able to perform optimally in Mathematics. Five criterions were said to be responsible for Asian learners' attitude towards Mathematics, namely: students' interest in Mathematics, students' anxiety toward Mathematics, students' Mathematics self-efficacy, students' extrinsic motivation and students' self-concept (Tahar, Ismail, Zamani & Adnan, 2010:476). It was further established among the Asian learners that goal-oriented learners should have positive concern about their academic performance; they should cultivate attitudes of discipline, diligence and

resourcefulness, and they should also be enthusiastic about their studies and play less (Radhika, 2019:32). Asian learners' attitudes towards Mathematics have been correlated to their attitude towards solving problems generally (Effandi & Normah, 2009:240). In light of the above discussion, the present study sought to establish if Grade 9 learners in Tshwane would perceive learners' attitudes as influencing their performance in Mathematics as is the situation in Asia presented above.

Studies in Nigeria revealed that attitude has been seen as a significant factor influencing Mathematics performance of learners (Serin & Mohammadzadeh, 2008:67; Bassey, Umoren & Udida, 2008:49; Oluwatelure & Oloruntegbe, 2010:102). Similarly, in Ghana, it was established that learners' attitude has been perceived as influencing learners' Mathematics performance (Mensah, Okyere & Kuranchie, 2013:134). The studies above confirm the SCT that informed the present study. The theory states that individual perceptions and attitude are often linked to learning experiences through the environment. The way individuals feel about a thing goes a long way to determine their actions (Williams & Finnegan, 2003:40). The present study sought to establish if the situation in Nigeria and Ghana is perceived as influencing the city of Tshwane municipality Grade 9 Learners' academic performance in Mathematics, in South Africa.

Learners' attitudes have been considered as vital among South African learners towards Mathematics performance (Carnoy & Arends, 2012:456; Buhagiar, 2013:68; George & Adu, 2018: 141; Middleton et al., 2016:669). Many South African learners may fail Mathematics as a result of the negative attitude they have developed for the subject (Reddy et al., 2016: 5; Department of Education, 2010: 59).

Learners' attitude has also been seen not to positively affect learners' academic performance. Examples of such literature are in America (Hwang, Choi, Lee, Culver & Hutchison, 2016: 137; Honicke & Broadbent, 2016: 117; Willson et al., 2008:1116), Europe (Ozsoy et al., 2009: 163; Alsop & Watts, 2003: 1044), Asia (Najmi, Raza & Qasi, 2018: 101; Yee, 2010: 681)

established that the correlation between attitude and learners' performance in Mathematics is rather weak and cannot be considered to be of serious significance.

Attitude was also established as a feeling and a construct of affective domain that does not necessarily affect the cognitive domain which is mainly required for academic tasks (Ozsoy et al., 2009:163; Alsop & Watts, 2003:1044). In relation to the studies above, the present study sought to establish if attitude is perceived as influencing Tshwane municipality Grade 9 Learners' performance in Mathematics, in South Africa as is in the situation presented above.

2.7 CONCLUSION

This chapter presented the related literature to the perceived factors influencing Learners' academic performance in Mathematics, in Tshwane municipality. Those factors reviewed were peer relationship, teacher-learner relationship, home background (parents' relationship and support), school environment and learners' attitude and academic performance as they influence Learners' Mathematics performance. The relatedness of the literature to the study was discussed. The next chapter focuses on the research methodology used in the study.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

The present study sought to establish the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics, in Tshwane municipality. In this chapter, the research methodology is presented. This chapter discusses the research paradigm, research approach, research design, population, samples for the pilot and the main study. In addition, the chapter discusses the instrumentation, procedures of data collection, data analysis, pilot study, the main study, validity, reliability and the ethical considerations.

The next section discusses the research paradigm for the present study.

3.2 RESEARCH PARADIGM

A paradigm is described as a pattern or model through which a concept is structured such as parts and their interrelationships; it shows how the parts function (Huitt, 2011:10). Furthermore, a paradigm is the conceptual lens that serves as a guide to the researcher on what is to be studied, the methodological aspects of the research that determines the applicable research methods that will be used and how the results of the study are interpreted (Mackenzie & Knipe, 2006:7; Greener, 2008:34; Saunders, 2009:119; Denzin & Lincoln, 2011:16). The aim of a research and how it is conducted can also be influenced by the paradigm used. According to Creswell (2009:8), there are four different paradigms: they are: positivism, post-positivism, interpretivism and constructivism.

The paradigm used in the present study is positivism. Positivism paradigm follows a classic survey approach to issues having to do with thoughts of objective reality (Creswell, 2008: 243, Greener, 2008:34). In addition, positivism is formal, with the use of deductive problem-solving approaches which allow the researcher to be concerned with why a particular problem exists and proffering a possible solution to the problem. Positivism is also objective and regulatory; this makes the researcher to be of concern with a rational clarification of causes of a particular problem and proffering possible solutions (Phillips & Burbules, 2000:189;

Saunders et al., 2009: 119). Furthermore, positivism paradigm is problem oriented in nature and finds practical means of solving the existing problems. In the present study, it is believed that there are possible perceived causes for the poor Mathematics performance of the Grade 9 Learners of Tshwane municipality; hence, the positivism paradigm employed in the study helped in finding out and determining the perceived factors influencing learners' performance. Positivism allows the researcher to gather information through a more objective measure (Glicken, 2003:29). In this study, the researcher was able to carefully gather information on the Grade 9 learners' perceived factors influencing their academic performance in Mathematics through a more objective measure through the use of positivism.

Positivism gives room for more interaction between the researcher and the participants (Creswell, 2008:243). In the present study, the researcher was able to interact with the participants through the use of questionnaires to investigate the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics, in Tshwane municipality.

Positivism paradigm is further described as the scientific method modified for the social sciences with the aim of producing objective outcomes and knowledge that can be generalised in respect of social patterns (Creswell, 2009:9). In the present study, the paradigm made room for more objective results that can be generalised. The quality of this paradigm is that it can be used for triangulation of data, methods and theories which was of immense importance in the present study (Denzin & Lincoln, 2011:8; Creswell, 2009:9; Creswell, 2008:243; Glicken, 2003:29). Since the present study sought to collect objective data, such as gathering information from learners through questionnaires, it was conducted within the parameters of the positivism.

The next section discusses the research approach of the study.

3.3 RESEARCH APPROACH

Research approach can be defined as the overall plan for collecting, measuring and analysing data (Gray, 2009:131). A research approach can also be explained to be the total plan for

linking conceptual research problem to relevant empirical studies (Van Wyk, 2011:3). This indicates that the research approach is meant to address the research questions on academic performance effectively. According to Van Wyk (2011:2), research approach can be obtained from the research problem which results from the research methods consisting the sampling, the data collection and the analysis. In this current study, a quantitative approach was mainly employed with a little qualitative data on perceived strategies for improving learners' performance.

The next section discusses the quantitative approach used in the present study.

3.3.1 Quantitative Approach

Quantitative approach is an inquiry method based on objectivity in measuring and describing phenomena, whereby the researcher maximises objectivity through the application of numbers, statistics, structure and control (McMillan & Schumacher, 2010:267). In quantitative approach, the researcher can objectively measure the variables of interest obtained from the research participants such as peer relationship, teacher-learner relationship, home background (parents' relationship and support), school environment and learners' attitude and academic performance in order to arrive at an unbiased conclusion (Cohen, Manion & Morrison, 2007: 323; McMillan & Schumacher, 2006:23). In the present study, variables of interest obtained from the research respondents were measured objectively and without a biased conclusion quantitatively. The quantitative approach helps the researcher to collect data from several respondents within the same setting and time (Patten & Newhart, 2018:24). The quantitative approach gives room for the researcher to cover a large area and reach many respondents within a short period of time and cost efficient (Patten & Newhart, 2018:24). In the present study, quantitative approach was used on the primary data collected from large numbers of respondents in the study with the aim of using the outcomes on a wider population.

Quantitative study is carried out by applying a range of methods of measurement for recording and investigating issues of social reality (Davis & Sutton, 2004:36). Quantitative researchers are of the view that reality can be estimated with the application of procedures that can avert misrepresentations of human comprehension (Creswell & Plano Clarke, 2007:22). The

quantitative approach was suitable for this study because of the social reality (peer relationship, home background relationship, teacher-learner relationship, school environment and learners' attitude happening within the society) involved in the study of perceived factors influencing academic performance of learners in the present study. In quantitative approach, data can be quantified by using a kind of statistical analysis (Zindiye, 2008:128). A quantitative statistical analysis was used in the present study to establish the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa.

The causality and deductive nature involved in quantitative approach is very high (Brady & Collier, 2004:118, Neuman, 2006:157). This also gives room for adequate investigation regarding the existing relationships of cause and effect. For these reasons, the quantitative approach was used in the present study to establish, confirm and validate existing relationships that contributes to the perceived factors influencing academic performance. Also, the procedures in quantitative approach are standard, with ease of frequent replication and measures that are systematically designed prior to the time of collecting data (Neuman, 2006: 157). In the present study, the researcher used a quantitative approach based on ideas, variables and procedures of measurement on the perceptions of factors influencing the Tshwane municipality Grade 9 Learner's performance in Mathematics. These perceived factors were defined prior to the commencement of the study and were consistently the same all through in the present study. Quantitative approach is objective in nature (McMillan & Schumacher, 2010:267). Therefore, the use of quantitative approach in this current study was appropriate in order to help the researcher to derive objective data to finding out the perceived factors that are influencing the Tshwane municipality Grade 9 Learner's performance in Mathematics, in South Africa. Quantitative approach also afforded the researcher the chances of testing hypotheses accurately. Inferences from tests of statistical hypotheses in a quantitative design leads to general inferences about characteristics of a population (Harwell, 2011:149; McMillan & Schumacher, 2010:26). In addition, the information generated from quantitative approach can impact on the appraisal of the perceived factors that are influencing the Tshwane municipality Grade 9 Learner's performance in Mathematics, in South Africa.

Quantitative methods give room for comparison of findings (Patten & Newhart 2018:24). In the present study, data collected by the researcher from a large number of respondents in a natural setting and time could be easily compared in another setting and times. In the present study, the use of quantitative approach helped the researcher to present the findings of the present study in a scientific style with the use of passive voice and impersonal language.

The use of qualitative approach supports the study of capturing direct experiences as they exist and views behaviour as decided by the event of experience (Neuman, 2006:122, Sidhu, 2003:110); however, qualitative studies are expensive and take a lot of time. Considering these mentioned advantages of quantitative over qualitative, the study is purely based on quantitative approach.

The research design used in the present study is discussed in the next section.

3.4 RESEARCH DESIGN

A good research design is a required template for which researchers are able to achieve a good and desired result in a study. A research design can be explained as the template or mode by which findings of investigations are viewed in order to derive answers to research questions (Cooper & Schindler, 2014:124; Creswell, 2009:21). A descriptive survey design was used in this study, and it is discussed in the next section.

3.4.1 Descriptive Survey design

A descriptive survey study design is a research design made to capture a true picture of an event or situation as it occurred in its natural state (Burns & Groove, 2009:201). In addition, descriptive survey design enhances a detailed account of the features, behaviour, feelings, abilities, knowledge and beliefs of a group of individuals or situation (Polit & Hungler, 2009:179). Due to the fact that the present study sought to give a detailed record of participants' opinion and knowledge on the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa within a secondary school setting and a real life situation; therefore, a descriptive

survey design was deemed necessary. The purpose of a descriptive survey research design is to collect data and information that can be analysed to derive patterns that could be used for comparisons (Gray, 2009:26). In the present study, data and information collected and analysed were used for comparison among the respondents in a bid to establish meaningful differences. Furthermore, the descriptive survey design can bring out the discovery of new meanings that could describe what exists and to further determine the frequency of occurrences (Burns & Grove, 2005:734).

McMillan and Schumacher (2010:489) established that descriptive survey design involves the selection of samples of participants, with the administration of questionnaires or interviews in order to obtain data on variables of interest. In the light of this, a descriptive survey design was employed in the present study to capture a clear and vivid picture of the perceived factors influencing Grade 9 learners' academic performance in Mathematics through the use of questionnaires. Survey design is most suitable for collecting factual and attitudinal information about beliefs, ideas, opinions, motives, feelings and behaviours in the past and present (David & Sutton, 2004: 162, Gray, 2004:100). In the present study, the survey method was considered the most suitable for generating factual or attitudinal information on Grade 9 learners' perceptions of factors influencing their performance in Mathematics in Tshwane municipality, in South Africa. The descriptive survey design is also deemed appropriate for the present study because of its nature on the relevance of personal factors and the need for contemporary data in order to establish an exploratory analysis of relationships.

The result generated from descriptive survey design can be used to generalise the entire target population with the use of probabilistic sampling (Cohen et al., 2007: 116). In this study, the descriptive survey design was used so that the result could be generalized to the entire target population of Grade 9 learners in Tshwane municipality. A descriptive survey design can be used in a study for the collection of original data to describe a large population that may not be captured through direct observation (Polit & Hungler, 2009:178). In this study, the descriptive survey design was adopted for the entire large population of Grade 9 learners in Tshwane municipality. Furthermore, in a survey, it has been established that individuals in a

sample usually find it easy to respond to a numbers of items in a questionnaire (Polit & Hungler, 2009:179). In the present study, information was generated through self-administered questionnaires which were personally given out to the Learners by the researcher. In addition, the application of the descriptive survey design in the present study enabled the researcher to collect demographic and quantitative information about the participants as explained by Babbie and Mouton (2002:80).

Survey research entails how data can be collected and quantified, which makes the data to become a permanent means of information for further studies (Ramalibana, 2005:24). In the present study, data collected and quantified were used as a permanent source of information on perceived factors influencing Grade 9 learners' Mathematics performance. Descriptive survey design has its weaknesses despite the numerous strengths highlighted which outweigh its weaknesses. Some of the weaknesses were that participants (Learners) who filled the questionnaires in the current study knew that they were under study, and this may produce biased data. Also, information provided by respondents may be relatively not thorough just because survey questionnaires may not probe thoroughly into the complexities and contradictions involved in the study of human behaviour and feelings. However, with the use of a few open ended questions in the questionnaire used for the descriptive survey, it was possible to overcome the weaknesses, thereby making the descriptive survey design the most suitable in the present study.

The population surveyed in the study is discussed in the next section.

3.5 POPULATION

In conducting a study through a survey, data would be collected from a part of the population. Population in research can be referred to as the group of people having shared traits from which the sample to be used for the study is chosen (Polit & Beck, 2006:258; Cooper & Schindler, 2014:337). The target population of the present study comprised of all Grade 9 Learners in public Secondary Schools in the city of Tshwane municipality in Gauteng Province. The SNAP survey of the Department of basic Education states that there are 475

public schools in Tshwane municipality (DBE, 2018:10), with a total of 143,175 Grade 9 learners (DBE, 2018:20). The target population was reduced to the study population that could be easily reached and controlled within Tshwane municipality.

3.5.1 Sample and Sampling procedure

A sample is a selected representative of a given population from which generalisations are made about the population (Neuman, 2006:225). Sampling can be explained as the selection of a segment of the population in the area where the research is being carried out in which the entire population is being represented (Neuman, 2006:225). In the present study, 400 participants (50 Grade 9 learners from 8 different schools) were used as the sample for the study; the participants were conveniently selected from Tshwane South, North and West districts, these schools were all public mixed secondary schools. These areas were selected due to their accessibility and closeness to the researcher as advised by Cohen et al. (2011: 143).

The breakdown of the participants is given below.

3.5.2 BIOGRAPHICAL VARIABLES OF THE RESEARCH PARTICIPANTS

Table 3.1 presents the biographical variables of the city of Tshwane municipality Grade 9 secondary school learners who participated in the current study.

Table 3.1: Biographical variables of secondary school learners in this study (N=400)

Biographical Variable	Variable Description	Responses from School Students
Gender	Male	120(30%)
	Female	280(70%)
	Total	400(100%)
Age	13-15 years	320(80%)
	16-18 years	80(20%)
	Total	400(100%)

Table 3.1 shows that there were more female Grade 9 learners than male Grade 9 learners in this study. The majority of the participating Grade 9 learners were in the 13 to 15-year age range while the minorities were in the 16 to 18-year age range.

3.6 INSTRUMENTATION

Copies of self-designed questionnaires were used as research instrument in the present study. The self-designed questionnaire was in line with the literature reviewed as informed by the SCT (This can be found on table 3.2). A questionnaire is a research instrument commonly used in quantitative study to draw inferences using quantitative forms, which involves philosophical assumptions (Creswell & Plano Clark, 2007: 4). The use of a questionnaire in quantitative methods in the present study is for data collection on specific reasons, thereby measuring the likes, dislikes, attitudes and beliefs of respondents in the quantitative study (Creswell & Plano Clark, 2007: 4). Copies of a self-designed and self-administered questionnaires were administered to the Grade 9 Learners of Tshwane municipality secondary schools to obtain data on the perceived factors influencing the Tshwane municipality Grade 9 Learners in Mathematics performance. A researcher-designed learners' questionnaire was used to collect data from the learners.

3.6.1 Questionnaire

Copies of the self-designed questionnaires were applied in this research to enable large numbers of participants to be reached at the same time. A questionnaire is a kind of document or a form designed to be administered to sampled participants in an attempt to obtain responses to given questions (McMillan & Schumacher, 2010:158). It consists of a number of questions or items properly organised, using the right words on a particular subject drawn on paper containing spaces for answers or responses from respondents with the use of a mark in the necessary spaces. A questionnaire is a research tool that makes room for measuring the likes, dislikes and knowledge of respondents in a study (McMillan & Schumacher, 2010:158). A questionnaire was used in order to reduce bias that may result from the personal features of the individual respondent in the present study with a high degree of anonymity, which does

not necessarily require the presence of the interviewer as advised by Nachmias and Nachmias (1996:225).

With the use of a questionnaire, the researcher was able to report on a wider geographical area at a reduced cost. However, there are some limitations with the use of questionnaire as an instrument, such as inability for the researcher to investigate deeply about the respondent's feelings and views (Burns & Grove, 2005: 35; Nachmias & Nachmias, 1996: 226). All given answers do not require clarifications, they remain final. With the use of some open-ended questions, the limitation was successfully dealt with. One of the limitations of a questionnaire is the chances of making use of ambiguous items which may be difficult for respondents to understand; this happens when the questionnaire is not properly constructed. Besides, in the present study, the participants were highly sensitized on the importance of the questionnaires and the sincerity that is required of the respondents. The respondents were implored to be sincere in their attempt in responding to the questionnaire items. Moreover, throughout the administration of the questionnaires, the researcher and research assistants were available to attend to issues that were not clear to the respondents. The review of the items by experts in the field of academic performance and using the pilot study for testing the items made room for overcoming the limitations.

The questionnaire items were presented in closed questions with a few open-ended question items on the perceived strategies that can be used to improve learners' performance. With the use of closed questions, respondents had a choice of answering through a set of predesigned responses such as: agree or disagree; similarly, respondents can choose from a set of numbers which represents the strength of feeling or attitude (Gray, 2004:195). Open-ended questions require respondents to write answers on their own without a predesigned response. Data from closed-ended questions are relatively easy to analyse, quickly coded and provide easier comparison of attitudes within groups (Gray, 2004:188, 195). A closed-ended question does not require extensive writing and as a result saves time. A closed-ended questions questionnaire is also ideal with large number of items (McMillan & Schumacher, 2010: 159).

Since the present study involves a large number of respondents and large number of items, the questionnaire for the study was mainly in a closed question format.

The questionnaire items for the present study were made based on a Likert type scale with four points. A Likert scale is described as a series of gradations, levels or values showing several degrees of an entity (Vanderstoep & Johnston, 2009: 54). The Likert type scale has an order through which respondents choose desired options that best explain their views. The Likert type scale was used in the present study for the structured items to make room for fairly accurate assessments of respondents' beliefs and opinions. The rating scales were used to manage the extent of responses in order to avoid dichotomous questions (Cohen et al, 2007: 325). A Likert type scale provides a range of answers to a particular question in which the answers can be applied in establishing the degree of agreement or disagreement with questions centered on attitude, belief or opinion such as, strongly agree, agree, disagree and strongly disagree (Vanderstoep & Johnston, 2009: 54). There is a need for the categories to be distinct and to wholly use the range of available possible answers of the respondents. The questionnaire used is called: Tshwane municipality Grade 9 Learners Questionnaire on Mathematics Performance. The questionnaire items were formed based on literature study. Examples of the questionnaire items detached from the literature are shown below in Table 3.2.

Table 3.2: A grid to show examples of items for the questionnaire obtained from the literature study by authors

AUTHOR(S)	ITEMS
Rambaran et al. (2017:525); Kirk (2014:78); Elicker et al. (2018:77); Filade et al. (2019: 83); Wang & Eccles (2012:891); Duflo, Dupas & Kremer (2009:321); Ndlazi (2005:66); Brown & Klute (2003:428); Llorca et al. (2017:3); Santrock(2014:319); Buhs, Ladd & Herald (2006:4); Olalekan (2016:35); Bankole & Ogunsakin (2016:83); Buhs, Ladd & Herald (2006:4); Santrock (2014:319), Wentzel (2017:586).	Peer relationship and academic performance
Uwaifo (2008:122); Karande & Kulkarni (2005: 961-967); Mathias (2009:5); Topor, Keane, Shelton & Calkins (2010:190); Radhika (2019:31); Deslandes et al.(2015:135);Jeynes (2017:885); Ravitch (2016:87); Li & Qiu (2018:91), George & Adu (2018:140).	Home background and academic performance
Carter & Darling-Hammond (2016:595); George & Adu (2018:140); Higgs, 2016:95; Cherrington & De Lange, 2016:375, Chirinda & Barmby (2018:117), Ruzek et al. (2016:95), Cantor et al. (2018:5); Jia et al. (2016:298); Steveson et al. (2016:820), Tshatshu, (2016:56).	Teacher-learner relationship and academic performance
Benbenishty et al. (2016:188); Byoung-Suk et al. (2017:36); Jacob et al. (2016:10); Odeh et al. (2015:4918); Idowu & Oluwole (2014:102); Roberts et al. (2008:405); Mbugua, et al. (2012:89); Kekare (2015:4), Kudari (2016:34).	School environment and academic performance
Serin &Mohammadzadeh (2008:67); Bassey et al. (2008:49); Oluwatelure & Oloruntegbe (2010:102); Carnoy & Arends (2012:456); Jacoby-Senghor et al. (2016:51); Jankowski (2017:211); Lukowski et al. (2016:56), Radhika (2019:31).	Learners' attitude and academic performance

3.7 TRAINING OF RESEARCH ASSISTANTS

In the present study, four research assistants were conveniently selected from some Tshwane municipality secondary schools to help in the collection of data from the participants. The research assistants selected are experienced in research works, the research assistants were teachers outside the selected secondary schools. The sampling procedures used in this research for the participants and administration of the questionnaire for the study was included in the training of the research assistance. The research assistants were employed during the conduct of the pilot study so as to ascertain the validity and reliability of the instruments used for data collection. The pilot study is an avenue to ascertain whether the research assistants would

understand the required research skills. In the next section, the details of the pilot study were discussed.

3.8 PILOT STUDY

A pilot study was carried out because of its importance in any research. According to Pratt and Loizos (2003:59), a pilot study is an essential component of a survey research which is referred to as a mini form of a full scale study showing the possibility of the main study and a pretest to a particular research instrument such as questionnaire. The pilot study is also defined as a mini process preceding a larger study or a prototype of a larger study (Schreiber, 2008: 625). However, it is pertinent to note that a pilot study does not really determine the success of the actual research study, yet it could enhance the possibility of its success. The use of a pilot study helps to avoid the use of ambiguous items and serves as a pointer to finding out if there were any problems in the administration of the research instruments. Random convenience sampling method was applied in the pilot study considering the nearness and availability of participants (Hawkes et al., 2004:13). The pilot study helps the researcher in refining the research questions and methods where necessary (Smith, 2009:191; Silverman, 2010:199; Maxwell, 2011:118; Robson, 2011:91; Creswell, 2013: 165). Refining of the questions implies critical questioning of the way the questions were framed (Galletta, 2013: 70). The outcomes of the pilot study necessitated changes to the items in the research instrument where necessary; examples were the merging of similar items together, thereby avoiding repetition. Finally, the item analysis from the pilot study helps the researcher to identify the validity threats and improve the reliability of the instrument in the present study (Neuman, 2009:123). In the present study, a pilot study of the questionnaire was administered to the learners. The pilot study comprising of fifty (50) participants (25 boys and 25 girls) was conducted in one of the schools within the research area for the main study, but participants were excluded from the main study. The process of sampling the Tshwane municipality Grade 9 learners was done after the familiarisation tour that was carried out by the researcher in order to obtain a general overview of the numbers, age range, family backgrounds of learners and their class time tables after the ethical clearance has been given. A total of fifty (50)

participants were randomly selected from the total sample comprising (25 boys and 25 girls) Grade 9 secondary school Learners from one of the schools outside the main study. The randomly selected participants for the pilot study were not included in the main study. The trained research assistants were involved in the pilot study. Samples for the pilot study were different from samples in the main study.

The respondents had the opportunity of making remarks on the self-administered questionnaire. The respondents' remarks were thoroughly looked into and necessary adjustments were effected prior to the final reproduction and presentation of the questionnaire to the respondents in the main study. The research assistants were used for the pilot study and the main study. The main study was carried out after the pilot study was done and the main aim of the main study was to collect necessary data that answers the main research question. The pilot study sample biographical grid for Grade 9 learners is presented in table 3.3 below.

Table 3.3 Grade 9 learners' pilot study sample grid (N=50)

Gender	Age range	Frequency	Percentage
Male	13-15years	18	36%
	16-18years	07	14%
Female	13-15years	16	32%
	16-18years	09	18%
Male		25	50%
Female		25	50%
Grand Total		50	100%

The next section presents the instrument significance used for data collection of the present study.

3.9 DATA COLLECTION PROCEDURE

With permission and approval from the school authority, the questionnaire was administered personally by the researcher on a particular date to the Grade 9 learners; this took place immediately after the school hours. It lasted for a maximum of 30 minutes to complete. The trained research assistants assisted in the administration of the questionnaire. (see Appendices E, F, G, H, I, J, K, L, O, P, Q, R, S, T, U and V for permission and approval letters from the school principals, parents, also Appendices C and D for the letter seeking permission from the Gauteng Department of Education and the approval letter).

The next section discusses the reliability and validity in quantitative study of the present study.

3.10 RELIABILITY AND VALIDITY IN QUANTITATIVE RESEARCH

In quantitative studies, validity and reliability are important aspects of an instrument to achieving a good quantitative study; using appropriate sampling methods and accurate measurement ensures the validity and reliability in the present study as advised by McMillan and Schumacher (2006: 183). In addition, the respondents used to achieve the reliability and validity of the questionnaire are homogeneous to the respondents in the main study as established by McMillan and Schumacher (2010:210).

3.10.1 Reliability

Polit and Hungler (2009:187) explained that reliability of a research instrument is the extent of consistency of the measure of an instrument and the attribute the instrument is meant to measure. The essence of having a reliable instrument is to reduce the influence of unrelated variables in the items intended for measurement (Mcmillan & Schumacher, 2010:210).

The test for the reliability of the questionnaire used was established through the test re-test method. Using the test re-test reliability coefficient enables a group of people to be measured twice; applying the same method with the two sets of scores obtained correlated (Mcmillan & Schumacher, 2010:211). The test re-test reliability was established after the pilot test in the present study. Copies of the questionnaire were given out to 50 Grade 9 learners of Tshwane

municipality secondary schools. The questionnaire was re-administered to 50 learners after two weeks. A Pearson product correlation coefficient(r) was used to establish the reliability of the questionnaire. The outcome of the reliability test for the Grade 9 learners is presented below.

Table 3.4 Grade 9 learners test re-test scores (N=50)

GRADE 9 LEARNERS	INITIAL SCORE (X)	RE-TEST SCORE (Y)
1	127	130
2	153	151
3	140	144
4	149	142
5	119	123
6	158	154
7	144	147
8	132	136
9	118	122
10	158	156
11	130	136
12	135	130
13	137	132
14	128	130
15	148	144
16	147	143
17	128	131
18	140	143
19	132	136
20	135	132
21	126	130
22	152	150
23	139	143
24	148	140
25	118	121
26	157	153
27	130	135
28	116	120
29	126	128
30	149	151
31	137	140
32	145	142
33	115	118
34	153	150
35	141	146
36	130	134
37	114	116
38	151	155
39	129	133
40	132	128
41	134	133
42	126	132
43	144	146
44	143	141
45	150	157
46	143	139
47	121	118
48	120	116
49	144	140
50	145	149

The outcome of the test re-test revealed a correlation coefficient of 0.95 which implies the high reliability of the instrument (The calculation details can be found in Appendix W).

3.10.2 Validity

Validity in research is defined as the relevance and appropriateness of the measuring instrument, a valid measuring instrument should be able to measure meaningfully what it is expected to measure such as the content and the details of the study (Burns & Grove, 2005:755; Polit & Beck, 2004:422).

In establishing the validity of the instrument used in the present study, the criterion jury was employed as well. Criteria jury evaluation has been established as a technique that is commonly used, and it is also a reliable measure of the validity of any instrument employed in any study (McKenzie, Wood, Kotecki, Clark & Brey, 1999:315). The evaluation jury involved experts in the area under investigation, who made necessary comments on the suitability of the instrument used by the researcher in the present study. The juries employed for establishing the validity of the instrument were professional educational psychologist, including the supervisor, a professor in the Department of Special Needs Education at Great Zimbabwe University and other experienced Mathematics teachers and research experts; they all examined the questionnaire items and made remarks on the clarity and pertinence of the items, to ensure that the items reflected the goals and objectives of the empirical study.

The next section discusses the data analysis used in the present study.

3.11 DATA ANALYSIS

In order for the data obtainable from the questionnaire to be understood, the data has to be organised and coded into a useable format in data analysis. Statistical analysis was used to present the results of quantitative analysis, while the little qualitative data on perceived strategies for improving performances was analysed in a narrative form. Frequency tables and ratios, Chi-square, Means, Standard deviations, and Pearson moment correlation co-efficient analysis were used to understand the relationship among variables. Statistical Package for the Social Sciences (SPSS) version 24.0 was used for data analysis of this study. The analysis was concluded in line with the objectives of the study.

The next section discusses the ethical consideration of the study.

3.12 ETHICAL CONSIDERATIONS

The following ethical issues are addressed in this study:

3.12.1 Permission

Permission to embark on the present study was requested from the Department of Basic Education, the university authorities, the school authorities and parents of the participants involved in the present study by writing letters seeking permission to conduct a research with the details and purpose of the research. The permissions were subsequently granted. The researcher is required and mandated to respect the rights, feelings and values of the participants (Davis & Sutton, 2004:19). Hence, permission was sought prior to the collection of data from the participants on the study. Participation in a study is not compulsory and participants were informed that they had every right to back out at any phase of the study.

3.12.2 Informed consent

Informed consent requires that researchers should educate the participants to ensure their decision about their willingness to participate in the research or not (David & Sutton, 2004:18). Allowing respondents to give an informed consent of their participation in any research is an important ethical rule that must be sought before the commencement of the study (Plous, 2013:1). The respondents in the present study were minors and consent was sought from the parents. The parents and the respondents were made to know the aims and details surrounding the study before they were allowed to participate in the study and they gave the researcher an informed consent in order to take part in the research so as to avoid deception (Henning, Gravett & Van Ransburg, 2005:73). Respondents were adequately informed about their privacy and sensitivity which is to be protected and the information gathered from them were strictly used for the study. Respondents in the present study were duly informed that their participation was not by compulsion; hence, they were at liberty to withdraw at any point in the course of the study without fear of victimisation or any harm. The respondents also appended their signatures on the consent forms following the detailed clarification of the researcher.

3.12.3 Anonymity

Anonymity is the morally acceptable protection of participants which makes the participants to remain unnamed and their identities remain private and free from disclosure (Neuman, 2011:73). In the present study, the researcher has an obligation to ensure the privacy of the participants as established by Neuman (2006:99). In addition, the participants enjoyed a high sense of confidentiality and protection against identification from other persons including the researcher as established by Cohen et al. (2011:64). Also, the respondents were not requested to identify themselves; however, codes were used in the study to ensure anonymity and to pave way for accurate and sensitive information.

3.12.4 Confidentiality

Confidentiality is defined as the none-disclosure of personal information regarding the participants or respondents in the study (Cohen et al., 2011:65). Participants were informed of a high degree of confidentiality in the course of the study, which implies that no participants' names were used or written in the questionnaire for the purpose of anonymity, rather the use of letters of alphabets and numbers was employed. The names of the schools and teachers involved in the present study were also undisclosed so as to protect participants' identities.

3.12.5 Harm to participants

Every researcher owns the participants in a study the major responsibility of protecting the participants from harm (David & Sutton, 2004:19; Robson, 2011:91). There are certain harms identified in research to respondents which may include irritation, anger, negative labelling, invasion of privacy and damage to personal dignity (Patten & Newhart 2018:24). In the present study, respondents were not exposed to any harm or embarrassment of any sort. Information collected was treated with the deserved privacy.

3.13 SUMMARY

This chapter discussed the research paradigm, research approach, research design, population, sample and sampling procedure, data collection instrument; this was a researcher-made

questionnaire, data collection procedures, data analysis, pilot study, main study, validity and reliability and ethical considerations were also discussed.

The next chapter addresses the data presentation, analysis and discussion of the findings in the study.

CHAPTER FOUR: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

The aim of the present study was to establish Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa. In the preceding chapter, the research paradigm, research approach, samples for both pilot and main study, instrumentation, data collection procedure, data analysis, pilot study; main study, validity, reliability and ethical considerations were discussed. This chapter presents analysis and discusses the findings of the study. Data are presented, analysed and discussed in line with the sub-research questions of the study. The findings of the study are presented in tables. The first column of each table represents the respondents; the second column represents the items stated in the questionnaire, and the third column represents the responses to the rating scale of the particular questionnaire item relating to the perceptions of Grade 9 learners on the relationship between peer relationship and their academic performance in Mathematics, in Tshwane municipality. The rating scale shows the level of agreement on the various statements from "strongly agree" to "strongly disagree". The last column represents ratios calculation. The number of responses observed for each questionnaire item has been indicated and the percentage each cell contributes towards the total frequency is provided in brackets.

In the following section, the findings of the current study on the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality are presented and analysed.

4.2 PERCEPTIONS OF GRADE 9 LEARNERS ON THE RELATIONSHIP BETWEEN PEER RELATIONSHIP AND THEIR ACADEMIC PERFORMANCE IN MATHEMATICS IN TSHWANE MUNICIPALITY

The first sub-research question presented in section 1.4.1 of Chapter 1 explored Grade 9 learners' perceptions of whether peer relationship had an influence on their academic performance in

Mathematics in Tshwane municipality. The findings of the present study on Grade 9 learners in Tshwane municipality are presented and analysed below.

Table 4.1: Peer relationship and academic performance of Grade 9 learners in Mathematics in Tshwane Municipality (N=400)

Respondents	Items	Responses				Total	Ratio
		SA	A	D	SD		
Grade 9 learners	I have a cordial interaction with my classmates which has helped me in taking Mathematics at all times	150(7.5%)	60(3%)	70(3.5%)	120(6%)	400(20%)	1.1
	My friends laugh at learners who do well in Mathematics	80(4%)	60(3%)	110(5.5%)	150(7.5%)	400(20%)	0.5
	I have friends who are very good in Mathematics and supports me in Mathematics classwork	180(9%)	60(3%)	35(1.8)	125(6.2%)	400(20%)	1.5
	I find it interesting coping with Mathematics when I am with my friends	140(7%)	80(4%)	60(3%)	120(6%)	400(20%)	1.2
	My friends bully and reject me in the class which affects my Mathematics performance	60(3%)	80(4%)	40(2%)	220(11%)	400(20%)	0.5
	TOTAL	610(30.5%)	340(17%)	315(15.8%)	735(36.7%)	2000(100%)	0.9

X^2 calculated= 16.94, X^2 critical= 21.03, df= 12

A Chi-square test was used to establish whether the pattern of response with reference to statements related to the perceptions of Grade 9 learners on the relationship between peer relationship and their academic performance in Mathematics, in Tshwane municipality. Chi-square test is mostly used for testing relationships between categorical variables in order to accept or reject the null hypothesis. Where the critical value is higher than the chi-square, it implies that there is no significant relationship of the variable being tested. Evidence from Table 4.1 shows that the calculated chi-square of 16.94 is less than the critical chi-square of 21.03 given 12 degrees of freedom at 0.05 significant level. Since the calculated chi-square is less than the critical chi-square, this means that there was no significant relationship between Grade 9 learners' perceptions on the relationship between peer relationship and the academic performance of Grade 9 learners in Mathematics, in Tshwane municipality. The ratio in the table shows that Grade 9 learners in Tshwane municipality negatively rated their satisfaction in the ways peer relationship has influenced their academic performance in Mathematics. The respondents evaluated some statements more positively (more to the "agree/strongly agree" side) and others to the more "negatively" ("disagree/strongly disagree") side.

The subsequent section presents the findings of the current study on the perceptions of the Grade 9 learners on the relationship between home background and their academic performance in Mathematics in Tshwane municipality.

4.3 PERCEPTIONS OF GRADE 9 LEARNERS ON THE RELATIONSHIP BETWEEN HOME BACKGROUND AND THEIR ACADEMIC PERFORMANCE IN MATHEMATICS IN TSHWANE MUNICIPALITY

The second sub-research question posed in section 1.4.2 of Chapter 1 examined Grade 9 learners' perceptions of whether home background relationship had an influence on their academic performance in Mathematics in Tshwane municipality. The following Table 4.2 presents the findings of the current study on the perceptions of the Grade 9 learners on the relationship between home background and their academic performance in Mathematics, in Tshwane municipality.

Table 4.2: Relationship between home background and academic performance of Grade 9 learners in Mathematics in Tshwane Municipality (N=400)

Respondents	Items	Responses				Total	Ratio
		SA	A	D	SD		
Grade 9 learners	My parents'/guardians' education has encouraged my performance in Mathematics	180(9%)	50(2.5%)	70(3.5%)	100(5%)	400(20%)	1.4
	My parents/guardians provide for my needs always	220(11%)	60(3%)	40(2%)	80(4%)	400(20%)	2.3
	My parents/guardian help me in my Mathematics homework	100(5%)	40(2%)	30(1.5%)	230(11.5%)	400(20%)	0.5
	My parents/guardians have not been showing concern about my Mathematics studies	180(9%)	80(4%)	40(2%)	100(5%)	400(20%)	1.9
	My parents/guardians are not good in Mathematics which discourages me	100(5%)	60(3%)	50(2.5%)	190(9.5%)	400(20%)	0.7
	TOTAL	780(39%)	290(14.5%)	230(11.5%)	700(35%)	2000(100%)	1.2

X^2 calculated= 19.68, X^2 critical= 21.03, df= 12

Table 4.2 shows that a calculated chi-square value of 19.68 resulted as the Grade 9 learners' perceptions of the relationship between home background and their academic performance in Mathematics in Tshwane municipality. The calculated chi-square value is not significant as it is less than the critical chi-square of 21.03 given 12 degrees of freedom at 0.05 level of significance. This means that there was no significant relationship between the Grade 9 learners' perceptions on the relationship between home background and their academic performance in Mathematics in Tshwane municipality. The ratio in the table shows that Grade 9 learners in the Tshwane municipality negatively rated their satisfaction in the ways their parents handled their Mathematics homework and lack of Mathematics knowledge by their parents in the subject.

The subsequent section presents the findings of the current study on the perceptions of the Grade 9 learners on the relationship between teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality.

4.4 PERCEPTIONS OF GRADE 9 LEARNERS ON THE RELATIONSHIP BETWEEN TEACHER-LEARNER RELATIONSHIP AND THEIR ACADEMIC PERFORMANCE IN MATHEMATICS IN TSHWANE MUNICIPALITY

The third sub-research question posed in section 1.4.3 of Chapter 1 examined Grade 9 learners' perceptions of whether teacher-learner relationship had an influence on their academic performance in Mathematics in Tshwane municipality. The following table presents results of the findings of the current study.

Table 4.3: Teacher-learner relationship and Grade 9 learners' academic performance in Mathematics in Tshwane Municipality (N=400)

Respondents	Items	Responses				Total	Ratio
		SA	A	D	SD		
Grade 9 learners	My Mathematics teacher believes I can perform well in Mathematics	260(13%)	80(4%)	40(2%)	20(1%)	400(20%)	5.6
	My Mathematic teacher's method of teaching is very difficult	80(4%)	50(2.5%)	90(4.5%)	180(9%)	400(20%)	0.5
	My teacher encourages my performance in Mathematics through group assignment	230(11.5%)	90(4.5%)	60(3%)	20(1%)	400(20%)	4.0
	My Mathematics teacher helps in solving difficult questions	190(9.5%)	95(4.8)	82(4.1%)	33(1.6)	400(20%)	1.2
	My Mathematics teacher gives me extra attention in Mathematics lesson	210(10.5%)	80(4%)	50(2.5%)	60(3%)	400(20%)	2.6
	TOTAL	970(48.5%)	395(19.8%)	322(16.1%)	313(15.6%)	2000(100%)	2.1

X^2 calculated= 29.68, X^2 critical= 21.03, df= 12

Table 4.3 shows the relationship between the Grade 9 learners' perceptions of the relationship between teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality. The calculated chi-square value of 29.68 resulted as the Grade 9 learners' perceptions of the relationship between teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality. This occurred because the calculated chi-square is greater than the critical chi-square given 12 degrees of freedom at 0.05 significant level. This means that there was a significant relationship between the Grade 9 learners' perceptions of teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality. The ratio in the table shows that Grade 9 learners in the city of Tshwane municipality positively rated their satisfaction in the ways teacher-learner relationship has influenced their Mathematics performance, their teachers were cordial with them, which implies that when such relationship is continuous, it may improve the learners' performance in Mathematics.

The subsequent section presents the findings of the current study on the perceptions of Grade 9 learners on the relationship between the school environment and their academic performance in Mathematics, in Tshwane municipality.

4.5 PERCEPTIONS OF GRADE 9 LEARNERS ON THE RELATIONSHIP BETWEEN SCHOOL ENVIRONMENT AND THEIR ACADEMIC PERFORMANCE IN MATHEMATICS IN TSHWANE MUNICIPALITY

Sub-research question in section 1.4.4 of Chapter 1 explored Grade 9 learners' perceptions of whether school environment had an influence on their academic performance in Mathematics in Tshwane municipality. The following Table 4.4 presents the findings of the current study on the perceptions of the Grade 9 learners on the relationship between school environment and their academic performance in Mathematics in Tshwane municipality.

Table 4.4: Relationship between school environment and academic performance of Grade 9 learners in Mathematics in Tshwane Municipality (N=400)

Respondents	Items	Responses				Total	Ratio
		SA	A	D	SD		
Grade 9 learners	My school classroom is good for learning Mathematics	290(18.1%)	60(3.8%)	40(2.5%)	10(0.6%)	400(25%)	7.0
	Poor school facilities can lead to poor performance in Mathematics	250(15.6%)	70(4.4%)	60(3.7%)	20(1.3%)	400(25%)	4.0
	My school classroom is too crowded for learning Mathematics	100(6.3%)	90(5.6%)	120(7.5%)	90(5.6%)	400(25%)	0.9
	My school has new buildings which make learning safe in the classroom	250(15.6%)	70(4.4%)	20(1.3%)	60(3.7%)	400(25%)	4.0
	TOTAL	89055.6%)	290(18.1%)	240(15%)	180(11.3%)	1600(100%)	2.8

X^2 calculated= 30.72, X^2 critical= 16.92, df= 9

Table 4.4 shows that the calculated chi-square value of 30.72 resulted as the relationship between Grade 9 learners' perceptions of the school environment and their academic performance in Mathematics in Tshwane Municipality. The calculated chi-square value was significant as it was greater than the critical chi-square of 16.92 given 9 degrees of freedom at 0.05 significant level. This means that there was a significant relationship between the Grade 9 learners' perceptions of school environment and their academic performance in Mathematics in Tshwane municipality.

The ratio in the table also indicated that Grade 9 learners positively rated their satisfaction that their school environment where teaching and learning of Mathematics took place had great impact on their performance in Mathematics.

The subsequent section presents the findings of the current study on the Grade 9 learners' perceptions of relationship between learners' attitude and their academic performance in Mathematics in Tshwane municipality.

4.6 PERCEPTIONS OF GRADE 9 LEARNERS ON THE RELATIONSHIP BETWEEN LEARNERS' ATTITUDE AND THEIR ACADEMIC PERFORMANCE IN MATHEMATICS IN TSHWANE MUNICIPALITY

The fifth sub-research question posed in section 1.4.5 of Chapter 1 explored Grade 9 learners' perceptions of whether learners' attitude had an influence on their academic performance in Mathematics in Tshwane municipality. The following Table 4.5 presents the findings of the current study on the Grade 9 learners' perceptions of relationship between attitude and their academic performance in Mathematics in Tshwane municipality.

Table 4.5: Relationship between attitude and academic performance of Grade 9 learners in Mathematics in Tshwane Municipality (N=400)

Respondents	Items	Responses				Total	Ratio
		SA	A	D	SD		
Grade 9 learners	I have self-confidence in myself that I can do any Mathematics exercise	50(2.1%)	70(2.9%)	80(3.3%)	200(8.3%)	400(16%)	0.4
	I am afraid of Mathematics as a subject	210(8.8%)	90(3.7%)	60(2.5%)	40(1.6%)	400(16%)	3.0
	I hate Mathematics	120(5%)	90(3.8)	120(5%)	70(2.9%)	400(17%)	1.1
	I am always absent in Mathematics class	70(2.9%)	100(4.2%)	70(2.9%)	160(6.7%)	400(17%)	0.7
	Mathematics is too difficult for me to learn	110(4.6%)	80(3.3%)	90(3.8%)	120(5%)	400(17%)	0.9
	I get nervous when it comes to solving mathematical problems	250(10.4%)	50(2.1%)	70(2.9%)	30(1.3%)	400(17%)	3.0
	TOTAL	810(33.8%)	480(20%)	490(20.4%)	620(25.8%)	2400(100%)	1.2

X^2 calculated= 36.54, X^2 critical= 25.00, df= 15

Table 4.5 shows the relationship between the perceptions of Grade 9 learners on the relationship between attitude and their academic performance in Mathematics in Tshwane municipality. The calculated chi-square test used showed that there was a significant relationship between the perceptions of Grade 9 learners on the relationship between attitude and their academic performance in Mathematics in Tshwane municipality. This occurred because the calculated chi-square is greater than the critical chi-square given 12 degrees of freedom at 0.05 significant level. This means that there was a significant relationship between the perceptions of Grade 9 learners' attitude and their academic performance in Mathematics in Tshwane municipality. The ratio in the table indicated that Grade 9 learners in Tshwane municipality positively rated their satisfaction that positive attitude towards Mathematics may bring about remarkable performance in Mathematics.

The next section presents the findings of the present study on perceptions of Grade 9 learners on the strategies that can be employed to improve Grade 9 learners' performance in Mathematics, in Tshwane municipality.

4.7 PERCEPTIONS OF GRADE 9 LEARNERS ON STRATEGIES TO IMPROVE THEIR PERFORMANCES IN MATHEMATICS IN TSHWANE MUNICIPALITY

The sixth sub-research question posed in section 1.4.6 of Chapter 1 explored the Grade 9 learners' perceptions of strategies to be employed to improve their performance in Mathematics. This section presents Grade 9 learners' perceptions of strategies necessary for improving their performance in Mathematics.

4.7.1 Responses from Grade 9 learners' perceptions of strategies for improving their performance in Mathematics

From the extracts of responses from the open-ended questionnaire items on the Grade 9 learners' perceptions of strategies for improving their performance in Mathematics in Tshwane municipality under peer relationship and academic performance.

4.7.1.1 Grade 9 learners' perceptions of the relationship between peer relationship and their academic performance

The study established that the Grade 9 learners believed that there is a need for learners to relate positively with one another. The Grade 9 learners revealed that when learners learn together and cooperate with each other in learning tasks, they improve and perform better in Mathematics as a subject. Through the interactive learning, other learners can discover themselves better.

The following extracts from the open-ended questionnaire items confirm the above statement.

> *I believe that there is a need for learners to be cordial with one another in their learning activities* (**Grade 9 Learner 034).**
> *I believe that learners that are paired with other learners that can perform well in Mathematics and can help others to be high achievers* **(Grade 9 Learner 051).**
> *I believe that learners must also learn to be friendly and not to be a bully to other learners* **(Grade 9 Learner 089).**

The following section presents Grade 9 learners' perceptions of the relationship between home background and their academic performance.

4.7.1.2 Grade 9 learners' perceptions of the relationship between home background and their academic performance

The Grade 9 learners' perceptions of educated parent who is supportive in the learner's homework will help the learner to be more dedicated to his or her academic tasks. Due to the poor Mathematics performance of learners and the necessity of the subject in all facet of academic endeavours, most educated parents have taken up the responsibility for the success of learners at school, due to the meaningful academic engagement given to their children. Educated parents also have a high level of occupational expectations from their children, hence they have to make it a duty helping their children to achieve their desired educational and occupational goals. The Grade 9 learners believed that when parents' level of income increases, such parents may be able to provide for their children's needs adequately in order to motivate them in their academic pursuits. Learners who do not have adequate funding tends to be distracted and emotionally unstable, especially learners who lack regular provision of basic needs, both at home and at school. It was also established from the learners' view that when parents do not provide for their children's needs adequately, this may

make the learners lose concentration on their studies. From the finding of the current study, it was perceived by the learners that parents should endeavour to be more actively involved in their children's home works and make periodic checks on learners' class work which may also make the learners to be more committed to their academic tasks. In the same vein, the learners perceived that fathers and mothers should live together as a family in order to be able to take care of their children collectively. This is perceived as capable of motivating the learners positively in their studies.

The following extracts from the open-ended questionnaire items confirm the above statements.

> *I believe that parents that are educated should be able to help their children* **(Grade 9 learner 130).**
> *I believe that parents' income level should be increased to enable them adequately provide for their children's need* **(Grade 9 learner 136).**
> *I believe that parents must live together and nurture their children together to achieve academic success* (**Grade 9 learner 200).**
> *I believe that parents that are good in Mathematics must give enough time to helping their children in home assignments* **(Grade 9 learner 204).**

The next section presents Grade 9 learners' perceptions of the relationship between teacher-learner relationship and their academic performance.

4.7.1.3 Grade 9 learners' perceptions of the relationship between teacher-learner relationship and their academic performance

The Grade 9 learners revealed that supportive and friendly teachers were perceived as influencing learners' performance in Mathematics. It was perceived by the learners that a positive teacher-learner relationship is crucial to learners' seriousness towards his or her academic task. Teachers that are adequately trained were perceived to have better methodologies of teaching which has impacted learners' performance. It was also perceived that teachers who play the role of parents to their learners were perceived to have encouraged learners' performances. Teachers that are patient with learners during Mathematics class were also perceived to motivating learners' performance and reduce Mathematics anxiety in the learners.

The following extracts from the open ended questionnaire items confirm the above statements.

> *I believe that teachers need to be friendly with learners* **(Grade 9 learner 220).**
> *I believe that teacher's method of teaching should be flexible* **(Grade 9 learner 230).**
> *I believe that teachers must give more attention to slow learners* **(Grade 9 learners 300).**

I believe that teachers must see learners as their children and ready to help them with their works when they experience any difficulty **(Grade 9 learner 201).**

The next section presents Grade 9 learners' perceptions of the relationship between school environment and their academic performance.

4.7.1.4 Grade 9 learners' perceptions of the relationship between school environment and their academic performance

Data from the Grade 9 learners viewed a conducive school environment as facilitating better academic performance in Mathematics. It was perceived that adequate school facilities have been instrumental for learners to be encouraged to study hard and to achieve better academic performance because they are motivated. It was perceived by learners that an overcrowded school environment with noisy classrooms have influenced learners negatively, thereby impeding the concentration of learners towards better Mathematics performance. Not only were learners distracted, the teachers were also disturbed, which could lead to being burn out. It was further revealed that schools where learners did not have adequate and comfortable seats, it was perceived that they were not able to concentrate in the classroom, thereby affecting their academic performance. It was also perceived that the poor state and unsafe conditions of school environment, including lack of potable water supply and dilapidated school buildings have negatively impacted on learners' academic performance.

The following extracts from the open-ended questionnaire items confirm the above statements.

I believe that when facilities in the school environment improves, teaching and learning will improve and make Mathematics performance better **(Grade 9 learner 103).**
I believe that over-populated schools are major causes of failure and government must build enough schools to shed the increased population among a few schools **(Grade 9 learner 110).**
I believe that classroom furniture must be adequate and in good order to make learning interesting **(Grade 9 learner 321).**
I believe that most schools with poor water supply makes learning unsafe and this should be provided for **(Grade 9 learner 305).**

The next section presents the Grade 9 learners' perceptions of relationship between learners' attitude and their academic performance.

4.7.1.5 Grade 9 learners' perceptions of the relationship between learners' attitude and their academic performance

The Grade 9 learners perceived that learners who lacked positive attitude in Mathematics had poor Mathematics performance; a positive attitude requires a learner to develop undivided interest and practice solving mathematical problems from time to time. Furthermore, learners who have hatred for Mathematics have been perceived as being unable to perform well in the subject. Most times, these learners are absent in the Mathematics class, and this has impeded their performances. It was also perceived that learners who are afraid and lack confidence in themselves had poor academic performances in Mathematics. These learners with poor self-confidence are always at the mercy of others. It was also perceived that there is a need for every child to build up courage in themselves. This will help learners to improve on their Mathematics performance.

The following extracts from the open-ended questionnaire items confirm the above statements.

> *I believe that having positive attitude will promote success in Mathematics performance* **(Grade 9 learner 301).**
> *I believe that learners must learn not to hate but love Mathematics as a subject* **(Grade 9 learner 324).**
> *I believe that learners who don't succeed in Mathematics do not attend Mathematics classes* **(Grade 9 learners 111).**
> *I believe that most learners are always afraid of Mathematics and that is why they fail* **(Grade 9 learner 400).**

The next section discusses the findings of the present study.

4.8 DISCUSSION OF RESULTS

The current study investigated the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, in South Africa as perceived by the learners, with a view of deploying possible strategies to overcoming the problems and proposing a model for improving Grade 9 learners' performance in Mathematics. In the current section, the findings from the study are discussed under six sub-headings derived from the sub-research questions posed in Chapter 1, section 1.4 that guided the present study. The sub-headings of the discussions are: Grade 9 learners' perceptions of relationship between peer relationship and their academic performance in Mathematics; Grade 9 learners' perceptions of relationship between

home background relationship and their academic performance in Mathematics; Grade 9 learners' perceptions of relationship between teacher-learner relationship and their academic performance in Mathematics; Grade 9 learners' perceptions of relationship between school environment and their academic performance in Mathematics; Grade 9 learners' perceptions of relationship between learners' attitude and their academic performance in Mathematics and the strategies to improve academic performance in Mathematics. The discussion of the findings in the present study was in relation to the local and international literature reviewed. In the first sub-section, the findings of the study on the Grade 9 learners' perceptions of the relationship between peer relationship and their academic performance in Mathematics in Tshwane municipality are discussed.

4.8.1 Grade 9 learners' perceptions of relationship between peer relationship and their academic performance in Mathematics in Tshwane municipality

The present section is a discussion of Grade 9 learners' perceptions of relationship between peer relationship and their academic performance in Mathematics in Tshwane municipality, South Africa as shown in the findings of the present study. This section addressed the sub-research question in Chapter 1, section 1.4.1.1 which reads as: To what extent do Grade 9 learners perceive peer relationship is influencing their academic performance in Mathematics in Tshwane municipality? References were made to available literature on the Grade 9 learners' perceptions of peer relationship on their academic performance in Mathematics.

In the present study, it was revealed that learners perceived that there is no significant relationship between peer relationship and their academic performance in Mathematics in Tshwane municipality. Grade 9 learners also negatively rated the extent of influence of peer relationship on their academic performance in Mathematics. In addition, Grade 9 learners in Tshwane perceived that they were not actually influenced by their peers in terms of academic performance. It also emerged from the present study that Grade 9 learners' perceptions of their academic performance was not linked to their peer relationship, possibly because Grade 9 learners do not perceive their peers as important to their studies. From the Grade 9 learners' perceptions, they were likely able to handle their academic tasks in Mathematics regardless of their peers. The finding of the present study on peer relationship concurs with studies of Roicki (2019:5) in Europe, Bosman and Schulze

(2018:2) in South Africa who all found that most learners do not depend on their peers for academic success; rather, they are able to motivate themselves towards better academic performance through independent learning.

It also emerged from the present study that learners perceived that peer relationship influence was weak among Grade 9 learners of Tshwane municipality. The finding of the present study on peer relationship was in agreement with studies in America (Ryan, 2015:114; Kirk, 2014:78) that peer relationship influence was stronger among students of higher institutions and not as strong among secondary school learners. The finding of the present study on peer relationship further corroborates the studies in Europe (Angrist, 2014:105), in America (Kirk, 2014:78; Hwang et al., 2016:137; Honicke & Broadbent, 2016:117), in Asia (Najmi et al., 2018:101; Yee, 2010:681), in Tanzania (Mosha, 2017:19) and in Nigeria (Olalekan, 2016:35) all found that peer relationship was not a strong factor that can influence learners' academic performance. This may possibly be explained in two ways: It has been perceived among American learners that older learners most times do not discuss their academic performance scores with their friends, secondly, the learners do not discuss their study method with their peers (Kirk, 2014:78). That is, peers do not necessarily know exactly what grades their friends achieved or how long it took for them to complete any given assignment or homework. This makes it possible for individual learners to give their peers wrong information about their academic performance as they grow. Although peer relationship may increase from time to time, learners may be able to avoid academic pressure resulting from peer relationships more easily as time goes on.

It was further made known that learners perceived that peer relationships most times did not focus on learners' academic activities. Meanwhile, learners grow from time to time and possibly begin to test their independence. This then may make them focus on negative peer relationship on antisocial behaviour outside the school and not on academic achievement (Kirk, 2014:78). Similarly, in the study of Angrist (2014:105) on peer characteristics and peer effect on the performance of Boston and New York learners in the School examinations, it was perceived that peer relationship does not have any influence on learner's academic performance. Furthermore, a longitudinal study of Hoxby and Weingarth (2006:215) on peer relationship in Chicago among the eight graders revealed that there was no significant effect of peer relationship on academic

performance. In contrast, some literature such as Boechnke (2018:150), Uzezi and Deva (2017:352), Rambaran et al. (2017:525) in America; Kadir et al. (2018:78) in Asia; Temitope and Ogunsakin (2015:324), and Wilson (2016:36) in Nigeria; Duflo et al. (2009:321) in Kenya; Santrock (2014:319), Buhs et al. (2006:4), Ndlazi (2005:66), Klute (2003:428) and Ryan (2002:103) in South Africa revealed that peer relationship was perceived as increasing the academic performance of learners. The possible reason for the difference between the literature and the result of the current study that peer relationship does not increase learners' performance may result from learners' geographical location. It might be from learners' type of schools, such as schools who make use of tracking. Some of the previous studies were also with the university students, while the current study only involved secondary school learners in a regular school.

The next sub-section discusses Grade 9 learners' perceptions of the relationship between home background relationship and their academic performance in Mathematics in Tshwane municipality as revealed by the finding of the present study.

4.8.2 Grade 9 learners' perceptions of the relationship between home background relationship and their academic performance in Mathematics in Tshwane municipality

The current sub-section discusses Grade 9 learners' perceptions of relationship between home background relationship and their academic performance in Mathematics in Tshwane municipality, South Africa as shown from the findings of the present study. References are made on the available literature on home background and academic performance. This sub-section addressed the sub-research question in Chapter 1, section 1.4.1.2 which reads as: To what extent do Grade 9 learners perceive home background is influencing their academic performance in Mathematics in Tshwane municipality?

It was revealed from the present study that learners perceived that there is no significant relationship between home background relationship and their academic performance in Mathematics in Tshwane municipality. Grade 9 learners of Tshwane municipality negatively rated their satisfaction on home background, meaning that Tshwane Grade 9 learners' perceptions of

home background relationship was perceived to be insignificant to their academic performance in Mathematics.

It was further perceived by the learners that most of the Grade 9 learners' parents were not financially buoyant to adequately provide for their children's educational needs, especially the single-parent homes, yet the learners were able to cope with the little they had. Hence, there was no perceived significant relationship of the home background influence on the Grade 9 learners. The finding of the present study on home background relationship corroborates these studies from America (Marschall & Shah, 2016:56; Tobin, 2013:120); Nigeria (Alade & Idowu, 2017:7); Kenya (Muola, 2010:215) and South Africa (Mattingly et al., 2015:552; El Nokali et al., 2010:990) all found that home background relationship was not a strong factor that can influence learners' academic performance. These studies established that there were several learners in different households, who had neither parents nor any parental support in their studies, yet they still performed well academically. In contrast, some literature such as (Jeynes, 2017:885; Ravitch, 2016:87) in America, (Deslandes et al., 2015:135; Kreider & Suizzo, 2009:12; Murphy, 2009:95) in Canada; (Niklas et al., 2015:79, 2016:55) in Europe; (Radhika, 2019:31; Kudari, 2016:32) in Asia, India; (Li & Qiu, 2018:91; Hill & Chao, 2009:229) in China; (Odeyemi, 2019:24; Adetayo & Kiadese, 2011:22; Uwaifo, 2008:122) in Nigeria; (Ferlazzo, 2015:35; Moula, 2010:214) in Kenya; (Bonga, 2010:2; Chinyoka & Ganga, 2010:156; Moyo, 2011:48) in Zimbabwe; and (George & Adu, 2018:140; Page, 2016:24; Perera et al., 2014:250; Karande & Kulkarni, 2005: 962; Topor et al., 2010:190; Mathias, 2009:5) in South Africa revealed that home background relationship was perceived as increasing the performances of learners' academic performance. The possible reason for the differences between the literature and the findings of this current study that home background did not increase Grade 9 learners' performance could be that learners stayed back in school to study with groups of learners before going home. It might also be possible that their teachers have been helpful in their studies after school hours because the learners may not have supportive parents and guardians at home. In addition, some of these learners may possibly enjoy learning and studying independently without their parents' involvement.

The next section discusses the Grade 9 learners' perceptions of the relationship between the teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality.

4.8.3 Grade 9 learners' perceptions of the relationship between teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality

The present study discusses the Grade 9 learners' perceptions of the relationship between the teacher-learner relationship and academic performance on their performance in Mathematics in Tshwane municipality, in South Africa as shown in the findings of the present study. This sub-section addressed the sub-research question in Chapter 1, section 1.4.1.3 which reads as: To what extent do Grade 9 learners perceive teacher-learner relationship is influencing their academic performance in Mathematics, in Tshwane municipality?

It came up from the present study that learners perceived that there is a significant relationship between Grade 9 learners' perceptions of teacher-learner relationship and their academic performance in Mathematics in Tshwane municipality. Grade 9 learners of Tshwane municipality rated their satisfaction on teacher-learner relationship positively. Furthermore, it emerged from the present study that learners perceived that teacher-learner relationship must be very cordial, which was perceived to have influenced the Grade 9 learners in their Mathematics performance. Similarly, Grade 9 learners who had cordial relationship with their teachers at school were perceived to have better performances. Also, the cordiality in the teacher-learner relationship adequately helps and encourages learners in their studies. The present finding on teacher-learner relationship concurs with the following studies (Cantor et al., 2018:5;Gehlbach et al., 2016:346; Ruzek et al., 2016:95; Jia et al., 2016:298) in America; (Murphy et al., 2016:11; Wallace, 2011:19, Levpuscek & Zupanic, 2009:543; Stevenson et al., 2016:820) in Europe, and (Carter et al., 2016:595) in Asia, which revealed that a strong link of cordial relationship between teachers and learners was capable of making learners to achieve well academically.

The present study also revealed that learners perceived that when teacher-learner relationship is in the positive direction learners will perform better academically. Furthermore, the study revealed that positive teacher-learner relationship was perceived by learners to bridge the gaps between

teachers and learners. It was also revealed that teacher-learner's positive relationship brings the teachers and learners closer, thereby positively influencing learners' academic performance. The finding of the present study on teacher-learner relationship is consistent with the view of Cantor et al. (2018:5), which asserts that better learners' academic performance depends on teachers' ability to put learners' background, emotional needs and relationships into consideration. This is in line with Bandura's SCT which informed this study, which states that positive interactions within a given environment promotes a better self-concept, which every child needs in order to be successful. Learners who do not have positive interactions with their teachers may find themselves failing to perform well in Mathematics due to the effect of teacher-learner relationship.

It was further established from the present study that learners perceived that teachers are the major propelling force necessary for the development, knowledge and academic growth of the child. The finding of the present study is consistent with studies in America (Ruzek et al., 2016:95; Steveson et al., 2016:822); in Europe (Murphy et al., 2016:11; Wallace, 2011:19; Srinivas & Venkatkrishnan, 2016:49; Juvonen et al., 2012:393); in Asia (Hamad, 2018:40); in Kenya (Waseka & Simatwa, 2016:73; Ochieng et al., 2017:45; Yara, 2009:366); in Nigeria (Adu & Oladuntun, 2007:59) and South Africa (Chirinda & Barmby, 2018:117; Ekdahl et al., 2018:5; George & Adu, 2018:140; Woolfolk, 2010:76) all established that positive teacher-learner relationship can bring the best out of a child, which in turn affects the developmental and academic growth of the child. Teacher-learner relationship is a catalyst for learners' educational development which is capable of improved learners' performance.

It was further revealed from the present study that learners perceived that the social quality of teachers in Tshwane municipality has influenced Grade 9 learners in their Mathematics performance. In addition, teachers' social quality was perceived by learners as essential to learning and performance in the present study. The present findings on teacher-learner relationship is consistent with the studies of Ruzek et al. (2016:95) in America, Srinivas and Venkatkrishnan (2016:49) in Europe that teachers who make themselves likeable and approachable at all times encourage learners to ask their teachers relevant questions in the areas of difficulty which had a positive impact on learners' performance. Furthermore, it emerged from the present study that learners perceived that teachers who do not influence their learners positively contributed to

learners' poor performance in Mathematics. It was also established from the present study that learners perceived that teachers who were able to model positive academic interest promotes better academic performance in their learners. The finding on teacher-learner relationship in the present study is in line with Bandura's SCT which informed this study, which states that learners look up to a mentor and a model who is able to model positive attitudes necessary for academic success to the learners which can be emulated afterwards. Learners who do not have mentors to look up to may find themselves failing to perform well in Mathematics due to the effect of poor mentorship and model in the teacher-learner relationship.

It was further revealed from the present study that learners perceived that learners perform better in Mathematics when their teachers are patient enough with them during class lessons. Furthermore, it was revealed in the study that learners perceived that learners perform better with passionate teachers who give additional assistance to them in their learning task. Teachers' willingness to explain further on any difficult task, topics or concepts as perceived by the learners made room for learners' performance. The finding on teacher-learner relationship in the present study is consistent with the views of Srinivas and Venkartkrishnan (2016:49) that when learners are unable to solve or do not understand certain concepts or topics, teachers are expected to repeat the teaching of the concepts or topics.

It was also established in the study that learners perceived that Tshwane municipality teachers who accord their learners a sense of self-worth was perceived capable of building up needed confidence in the learners, which had a positive impact for better academic performance. The finding of the present study concurs with the following studies, in Asia (Lei et al., 2018:1; Longobardi et al., 2016:994; Sfard, 2016:43; Carter et. al., 2016:595), Kenya (Waseka & Simatwa, 2016:73; Ochieng et al., 2017:45) and Botswana (Maniraho & Mugabo, 2019:18; Maniraho, 2017:38) that learners are encouraged when their teachers believe in them. The finding on teacher-learner relationship is in line with the Bandura's SCT which informed the present study, which states that learners' academic performance can be achieved when teachers' beliefs are shaped through collective efficacy to encourage and educate the learners. Learners whose teachers do not believe in may find themselves failing to perform well in Mathematics due to the effect of teachers' negative beliefs on learners' efficacy in the teacher-learner relationship.

The current study further revealed that teacher's methodologies and strategies were perceived as inadequate and ineffective for improved learners' performance in Mathematics. Teachers should also come up with teaching strategies for motivating learners' academic performance, owing to the fact that teachers' ability to motivate learners cannot be underestimated due to their wealth of teaching methodologies. The finding of the study on teacher-learner relationship concurs with the studies of Radhika (2019:15) in India and (Chirinda & Barmby, 2018:117; Ekdahl et al., 2018:5; Woolfolk, 2010:76; Manzo, 2008:23; Wolhuter & Van Staden, 2008:110) in South Africa. These authors affirmed that teacher-learner relationships are seen as motivating. It enables teachers to give needed support to learners for them to perform better in their academic tasks. In contrast, some literature (Kim et al., 2018:4; Rivkin et al., 2005:12) in America had a view that the correlation between teacher-learner relationship and learners' performance in Mathematics is rather weak and cannot be considered to be of serious significance. Similarly, it was further established that learners' academic performance was not related to teacher-learner relationship. The possible reason for the differences between the literature from previous studies and the finding of this present study that teacher-learner relationship increased Grade 9 learners' performance could be that there has never been an agreement on the exact teacher-learner factors that influence learners' academic performance as argued by Rivkin et al. (2005:12).

The next section discusses Grade 9 learners' perceptions of the relationship between the school environment and their academic performance in Mathematics in Tshwane municipality.

4.8.4. Grade 9 learners' perceptions of the relationship between the school environment and their academic performance in Mathematics in Tshwane municipality

The present study investigated the Grade 9 learners' perceptions of the relationship between the school environment and their academic performance in Mathematics in Tshwane municipality, South Africa as shown in the findings of the present study. This section addressed the sub-research question in Chapter 1, section 1.4.1.4 which reads as: To what extent do Grade 9 learners perceive school environment is influencing their academic performance in Mathematics, in Tshwane municipality?

It was discovered from the present study that learners perceived that there is a significant relationship between the school environment and academic performance of Grade 9 learners in Mathematics in Tshwane municipality. Grade 9 learners of Tshwane municipality positively rated

their satisfaction on the existing relationship between school environment and academic performance in Mathematics among Grade 9 learners.

The study revealed that learners perceived that learners' learning environment is an integral part of teaching and learning process. However, the learning environment was perceived by learners as not conducive enough for learning, both learners and teachers are affected by the classroom environment. Furthermore, it emerged from the present study that there were poor classrooms which did not make learning effective, especially in Mathematics. The lack of conducive classroom environment was also perceived to have negatively influenced the teaching and learning of Mathematics of Grade 9 learners in the Tshwane municipality schools. In addition, the unavailability of conducive classrooms was perceived as a form of hindrance to academic performance, which was capable of depriving many learners who are struggling with Mathematics as a subject from learning effectively.

The study further revealed that the Tshwane municipality Grade 9 learners' believed that their classrooms were over-crowded for learning, especially for Mathematics. In a classroom situation where there are more than enough learners in a class, the situation tends to be rowdy, noisy and disorganised. When learners exceed the number of available classrooms, learning also becomes distorted. Such learners may also not be attentive during classroom lessons; therefore, teaching and learning objectives may not be achievable. When situations like this arises, it may likely result into a poor academic performance of learners. The present study findings on school environment is consistent with literature from America (Hodson & Sander, 2017:18; Kweon et al., 2017:37; Benbenishty et al., 2016:43; Caskey et al., 2016:106; Healthy Schools Network, 2013:5; Shindler et al., 2009:64), Europe (Murugan, 2013:302; Shadrek, 2012:415; Cohen et al., 2009:46), India (Kudari, 2016:34), Nigeria (Jacob et al., 2016:10; Oselumese et al., 2016:12; Idowu & Oluwole 2014:102; Omotere, 2013:45), Uganda (Verspoor, 2006:276), Tanzania (Semali et al., 2016:54; Wilson, 2011:132), Tunisia (Khalil & Saar, 2009:144), Egypt (Yilmaz, 2009:38), Libya (Khalil & Saar, 2019:48), Somalia (Kekare, 2015:4), Kenya (Othoo et al., 2019:395; Mbugua et al., 2012:88; Otieno & Yara, 2010:127), Botswana (Maniraho, 2017:38) and South Africa (George & Adu, 2018:138; Marais, 2016:56) which reveals that poor classroom condition compromises learners' academic performance. The finding of the present study on school environment also concurs with

Hodson and Sander (2017:18) and Kweon et al. (2017:37) that a conducive classroom in the school environment was perceived as a necessity for effective learning in education in America. It was also established that learners' academic performance can be significantly moulded in high-risk urban environments where a positive, supportive and culturally conscious school environment exists. The finding of the present study on school environment is in line with Bandura's SCT which informed the present study, which states that individuals learn from their social environment; hence, the learning environment must be enabled and safe for effective learning. Learners whose learning environment is unsafe and hostile may also find themselves failing to perform well in their studies due to the effect of poor school environment.

It further emerged from the present study that learners perceived that some of the school environments are hostile to their safety, such as unavailability of infrastructures and dilapidated nature of existing infrastructures, including the lack of potable water in the school compound. Learners believe that learners and teachers from this poor environment have tendencies of being absent from school, which is a major inhibition to teaching and learning. The finding of the present study on school environment is consistent with the South African studies of (Marais, 2016:56; George & Adu, 2018:138) which established that learners who attend schools where infrastructures are not in place, teaching and learning may become a difficult task for both teachers and learners. In contrast, some studies (George et al., 2018:323; Fredricks et al., 2016:2; Lawson & Masyn, 2015:68) in America, (George et al., 2018:325) in China have considered school environment as having no significant relationship with learners' academic performance. The possible reason for the differences between the literature from previous studies and the findings of the current study that school environment increases learners' academic performance was that, it was established that teachers interviewed about the disruptive nature of school buildings and physical structures on learners' performance revealed that, it was perceived that poor school conditions may possibly reduce learners' morale and motivation. However, it was argued that learners may be able to obtain good learning outcomes despite unpromising and unattractive school premises. Academic performance among American learners was considered a function of learners' academic engagement, which was more critical to performance than the school environment. It was also revealed that physical school structures cannot substitute for cognition, which is seen as the major need for learners' academic excellence in Mathematics.

The next section discusses Grade 9 learners' perceptions of the relationship between learners' attitude and their academic performance in Mathematics in South Africa.

4.8.5 Grade 9 learners' perceptions of the relationship between learners' attitude and their academic performance in Mathematics in Tshwane municipality

The present study investigated Grade 9 learners' perceptions of the relationship between learners' attitude on their academic performance in Mathematics in Tshwane municipality, South Africa as shown in the present study. This section addressed the sub-research question in Chapter 1, section 1.4.1.5 which states as follows: To what extent do Grade 9 learners perceive learners' attitude is influencing their academic performance in Mathematics, in Tshwane municipality?

It was revealed from the study that learners perceived that there is a relationship between the learners' attitude and academic performance in Mathematics among Grade 9 learners of Tshwane municipality. In addition, Grade 9 learners of Tshwane municipality positively rated their satisfaction on the existing relationship between learners' attitude and academic performance in Mathematics among Grade 9 learners of Tshwane municipality.

It was further established from the present study that learners perceived that learners' attitude towards their academic performance has not been in a positive direction. It was also revealed that learners had negative attitude towards learning Mathematics as a subject. Learners' negative attitude has been perceived to be a major problem confronting learners in learning Mathematics. When learners do not have self confidence in themselves that they can perform a task, no matter how they are being taught, they may not still do well. Therefore, learners' inability to perform well is based on the fact that they have already formed an opinion about the subject and themselves that they cannot do well in the subject. The finding of the present study on learners' attitude and performance is consistent with the views of George and Adu (2018:137) who established that the overall trend for learners' attitude about the utility of science was positive; however, learners' attitude towards science and Mathematics was perceived to decline over the middle school and high school years.

It was further revealed from the current study that learners perceived that the most important time-varying predictors of both attitudes were poor science self-concept, peer attitudes, and learners' poor participation in Mathematics and science related activities. At this time, learners have become fixated in their personal thoughts and with their lack of interest in the subject. The finding of the present study on learners' attitude is in line with Bandura's SCT which informed the present study, which states that learning takes place in a social context and most often by observation. More so, learners' personal thoughts and beliefs have a strong influence on both learning and interpreting contextual events. Learners with poor self-concept may find themselves not performing well in Mathematics as a result of learners' poor self- concept in Mathematics.

It was also discovered from the current study that learners' perception about Mathematics is that, Mathematics is a very difficult subject that cannot be easily learnt or understood. Therefore, learners felt that they may not need the subject in the nearest future. Based on these perceptions, Grade 9 learners' performance in Mathematics has been grossly affected. The finding on learners' attitude in the present study concurs with Hassan (2008:131) who established that learners' commitment and interest to learn Mathematics can be influenced by the fact that the learners either enjoy or do not enjoy the subject or value the subject based on its usefulness to themselves and the society. Lukowski et al. (2016:56) established that European learners who display moderate and acceptable behaviour in classroom tasks are motivated to work harder for higher grades and make positive attempt to overcome difficulties. These Asian studies (Radhika, 2019:31; Tinio, 2009:72; Tezer & Karase, 2010:5808; Yilmaz et al., 2010:4502; Tahar et al., 2010:476) also shared similar views with the European studies.

The study also revealed that Grade 9 learners perceived that the methods involved in Mathematics was too complex; hence, confusing to them. Learners' perception on methods involved in teaching the subject may negatively influence Grade 9 learners' performance in Mathematics. The methods involved in teaching Mathematics is perceived as boring to the learners and resulting to lack of interest. The finding of the present study on learners' attitude is consistent with studies from Ghana (Mensah et al., 2013:134) which reveals that Mathematics has been rule oriented among Ghanaian secondary school learners. This has prevented learners from experiencing the richness of Mathematics and the many approaches needed to develop competence in the subject, thus, making learners to develop negative attitude towards Mathematics. The finding of the present study on

learners' attitude is in line with Bandura's SCT which informed the present study, which states that individual perceptions and attitude are often linked to learning experiences through the environment and the way individuals feel about a thing goes a long way to determine their actions. Learners who do not have positive attitude towards their studies may find themselves not performing well in Mathematics as a result of learners' negative attitude and perceptions of Mathematics as a subject.

The finding of the present study on learners' attitude concurs with Buhagiar (2013:68) who established that most South African learners regarded Mathematics as a difficult, uninteresting, abstract and dry subject. Reddy et al. (2016:5) and Department of Education (2010:59) also confirm that many South African Grade 9 learners have been consistently failing Mathematics as a result of the negative attitude they have developed for the subject.

The finding on learners' attitude in the current study also corroborates the study of Rammala (2009:19) which affirms that the negative attitude of South African learners towards learning could result in learners' poor performance in Mathematics which has consistently been preventing most learners from obtaining required entrance results for university and other higher education. Furthermore, the finding of the present study on learners' attitude concurs with Middleton et al. (2016:669) who established that learners' personal and negative interest have been perceived as a major impediment to learning and performing well in Mathematics among South African Grade 9 learners.

It was further proven from the study that learners perceived that most learners are very nervous when it comes to Mathematics as a subject, this nervousness can be attributed to Mathematics anxiety which has been linked with poor attitude from the learners. This poor attitude has prevented many learners from making reasonable success in mathematical concepts. The finding from the present study on learners' attitude is consistent with Lukowski et al. (2016:56) in America that there are several sources of negative attitudes among American learners toward Mathematics performance, but the major source of learners' negative attitude is Mathematics anxiety of learners. From the finding of the current study on learners' attitude, learners Mathematics anxiety has been established as an impediment to learners' Mathematics performance among secondary school

learners. The finding of the present study on learners' attitude concurs with the following European studies (Gunderson et al., 2017:103; Park et al., 2016:310; Ramirez et al., 2016:310). In contrast, some studies such as (Hwang et al., 2016:137; Honicke & Broadbent, 2016:117; Willson et al., 2008:1116) in America; (Ozsoy et al., 2009:163; Alsop & Watts, 2003:1044) in Europe; and (Najmi et al., 2018:101; Yee, 2010:681) in Asia have established that learners' attitude was not perceived as having any significant relationship with academic performance. It was also established that the correlation between attitude and learners' performance in Mathematics is rather weak and cannot be considered to be of serious significance. The possible reason for the differences between the literature from previous studies and the finding of this current study that attitude increases learners' performance was that attitude has been perceived as a construct of affective domain that does not necessarily affect the cognitive domain of learners. Although the affective domain in science and Mathematics has been recognised as important long ago, but it has not received much attention by researchers in cognitive dimensions. Attitude was also viewed as a feeling, and feelings cannot be balanced with reasoning (Alsop & Watts, 2003:1044).

The next section discusses the possible strategies for improving the Grade 9 learners' academic performance in Mathematics in Tshwane municipality, South Africa.

4.8.6 Possible strategies for improving the Grade 9 learners' academic performance in Mathematics in Tshwane municipality, South Africa

The present study finding discusses possible strategies for improving Grade 9 learners' academic performance in Mathematics in Tshwane municipality, South Africa as shown in the present study. This section addressed the sub-research question in Chapter 1, section 1.4.1.6 which states as follows: What are the perceived strategies that can be used for improving the Grade 9 learners' academic performance in Mathematics in Tshwane municipality?

The present study revealed the following possible suggestions perceived by the learners that may be put in place to improve their academic performance in Mathematics: 1. Cordial relationships between learners in learning activities; 2. Pairing learners with other learners that can perform better in Mathematics; 3. Friendliness and avoidance of bullying by peers. These are summed up

as peer mentor-mentee strategy. In addition, it was suggested that: 1. Educated parents should help learners in their school home works; 2. Increase in the level of parents' income; 3. Living together of both parents. These are also summed up as familial-cum-socioeconomic adjustment strategy. Furthermore, it was suggested that: 1. Teachers must be friendly with learners; 2. Teachers must improve their teaching methodology; 3. Teachers should pay more attention to slow learners and teachers should regard the learners as their children. These are further summed up as teachers' effectiveness strategy. It was also suggested that: 1. Facilities in the school environment must be improved; 2. Government should build more schools; 3. Furnish the classrooms adequately. These are summed up as school plant management system. Furthermore, it was suggested that: 1. Learners should cultivate positive attitude; 2. Learners should learn to love Mathematics; 3. Learners must be regular at school and in all lessons, especially, Mathematics and lastly: 4. Learners must learn to overcome fear and Mathematics anxiety. These are also summed up as extrinsic motivation (reward) strategy among the learners.

The study also revealed the importance and need to proffer solutions to improve the Grade 9 learners' academic performance in Tshwane municipality, South Africa. The finding of the current study concurs with Hajovsky et al. (2020:111) who established that there is an urgent need to find possible solutions to the problems of Mathematics failure among South African learners.

It was also suggested in the present study that the Grade 9 learners' Mathematics performance of Tshwane municipality can be improved through peer mentor-mentee strategy. Peer mentor-mentee strategy may be described as pairing learners who are higher achievers together with the lower achieving learners in order to mentor them towards better Mathematics performance. This strategy is capable of establishing cordial relationships among learners in their Mathematics learning activities. When learners understand the place of cordial relationship in their studies through peer mentor-mentee strategy, it will assist them in helping each other where they experience difficulty in solving any mathematical problem. The finding of the current study on peer mentor-mentee strategy concurs with Elicker et al. (2018:77); Llorca et al. (2017:3) in Europe. These studies revealed that pairing learners promotes cordial relationship among learners, which is capable of helping other weak learners to be successful academically. In the present study on peer mentor-mentee strategy on learners' Mathematics performance, it was also suggested by learners that

pairing learners with other learners that can perform better in Mathematics would assist other learners that are not so good in Mathematics to improve their performances. The findings of the present study on peer mentor-mentee strategy for improving Mathematics performance concur with the study of Ammermueller and Pischke (2009:318); Beiswenger and Grolnick (2010:370); Deci et al. (2006:318) in Europe who established that when learners are paired with other learners that are better in Mathematics, such learners are able to mentor and model better Mathematics performance to their peers who are poor in Mathematics.

It was also suggested in the present study by learners that when peer mentor-mentee strategy is in place, peers may become friendly. Also, friendly peers are able to help poor learners overcome Mathematics failure when the poor learners are loved and not bullied. Learners that are often bullied and rejected do not perform well academically. The findings of the present study on peer mentor-mentee strategy for improving Mathematics performance concur with Wentzel (2017:586) in America, who revealed that when learners are loved and accepted by their peers, peer rejection would be averted, this in turn encourages the learners and further builds a sense of belongingness into them, which is capable of attracting such poor learners towards improved performance in Mathematics.

The learners suggested in the present study that if there is adequate familial-cum-socio-economic adjustment strategy, the Grade 9 learners' Mathematics performance may be improved. Familial-cum-socio-economic adjustment is the ability of parents coming together as an intact family which may improve their financial strength, thereby facilitating help for their children's academic performance. With familial-cum-socio-economic adjustment of parents, educated parents would rise up to expectation by cultivating the habit of guiding their children in their home works. This may encourage the learners and further assist the learners to put in their best in their studies, especially in Mathematics. The finding of the present study on familial-cum-socio-economic adjustment corroborates the studies by Jeynes (2012:718; 2017:885) in Europe, Li and Qiu (2018:91) and Kudari (2016:32) in Asia that educated parents whose children had their support in their studies performed better than other learners who did not have educated parents that could help or guide them in their studies. Niklas et al. (2015:79, 2016:55) also revealed that supportive

educated parents in Europe helped their children in the timely accomplishment of school home works and assignments frequently, thereby giving a high impact for better academic outcomes.

It was further suggested in the present study that when there is adequate familial-cum-socio-economic adjustment, parents' income improves, learners' educational and personal needs can be taken care of and as a result, such learners are encouraged and propelled to do better. Learners may also perform better due to the fact that the learners may have gained some psychological stability unlike when the learners' needs got them overwhelmed and discouraged which was a source of failure among learners. The findings of the present study on familial-cum-socio-economic adjustment strategy for improving Mathematics performance concur with Lacour and Tissington (2011:522) who revealed that American learners whose needs are adequately met by their parents perform better academically than other learners whose needs are not adequately provided for.

It was also suggested by learners in the present study that familial-cum-socio-economic adjustment should be in place (in which case, the parents will be together and their attention for the child will improve). Familial adjustment could make parents to live together so as to train their children collectively and adequately love the child. This may in turn make the child happy at all times, which is necessary for classroom concentration, not only this, but it will also help in getting learners' need met adequately. The findings of the present study on familial-cum-socio-economic adjustment strategy for improving Mathematics performance concur with Odeyemi (2019:24) in Nigeria, and Radhika (2019:31) in India who all established that when both parents live together, they are a major form of security to the child. When parents live together it makes the learners to share their feelings and challenges with their parents, believing that solutions would be proffered to their academic challenges.

It was also suggested by the learners in the present study that teaching effectiveness strategy is capable of fostering cordial and friendly teacher-learner relationship. Teaching effectiveness may be described as the ability of teachers to embrace all teaching and affective skills needed for learners' academic performance. Teachers that are friendly with learners are able to encourage them to learn and perform well in school learning activities. The findings of the present study on teaching effectiveness for improving Mathematics performance concur with Gehlbach et al.

(2016:346) in America who revealed that when teaching effectiveness is not in place, teacher-learner relationship may not be cordial and friendly. This can make learners to be disengaged from classroom activities.

It was further suggested by the learners that teaching effectiveness should be a priority in which teacher's wealth of methodology must be adequately applied when teaching. This will go a long way to helping learners learn Mathematics easily and perform well. Teachers should also deploy every needed teaching skills in Mathematics which is capable of giving learners better understanding of the subject. Chirinda and Barmby (2018:117) in South Africa revealed that teachers who do not have adequate understanding of teaching effectiveness strategies may not be capable of solving learners' mathematical problems. The lack of teaching effectiveness may make learners vulnerable, which may contribute to learners' failure in Mathematics.

The learners further suggested in the present study that when teaching effectiveness is in place, teachers would pay more attention to slow learners. When teachers equally regard the learners as their children, the teachers would be patient enough with them during classroom lessons, thereby enabling learners to ask questions in the areas of difficulty and the teachers are able to go over topics taught. This is capable of making the learners to understand better the difficult topics or concepts. The finding of the present study on teaching effectiveness strategy concurs with the study of Srinivas and Venkatkrishnan (2016:49) in Europe which established that when teachers are patient during classroom teaching, the learners are able to grasp better.

Learners who participated in the present study suggested that credible school plant management system should be put in place which could make school environments to be conducive. School plant management system may be described as the timely and adequate provision of school amenities, which is capable of promoting conducive environment for learning. This may make learners to learn comfortably and gain better understanding of every topic learnt. The finding of the current study on school plant management system concurs with Byoung-Suk et al. (2017:36) in America, who established that a conducive school environment was seen as a necessity for effective learning in education.

It was further suggested in the present study by the learners that government should build more and adequate classrooms capable of accommodating learners conveniently, thereby avoiding rowdy and overcrowded classroom which has been perceived as an impediment to teaching and learning Mathematics. The findings of the present study on school plant management system for improving Mathematics performance concur with Jacob et al. (2016:10); Oselumese et al. (2016:12); Idowu and Oluwole (2014:102) in Nigeria who revealed that where learners' population exceeds the size of the classroom, learners may not concentrate in the class, therefore, adequate classrooms must be built to enhance learners' academic performance. The learners in the present study also suggested that school classrooms must be adequately furnished and be made functional for learning. Several non-functional classrooms have contributed to learners' failure in Mathematics. The findings of the present study on school plant management system for improving Mathematics performance concur with Omotere (2013:45) in Nigeria who established that school facilities, class size, school location and school plant are factors perceived to be influencing academic performance of secondary school learners.

It was further suggested by learners in the present study that learners should be extrinsically motivated by being rewarded for every positive attitude exhibited. Extrinsic motivation of learners may come in form of rewarding learners for every acceptable behaviour demonstrated towards their academic performances. When learners are motivated, learners would cultivate positive attitude necessary for better academic performance. Most learners who have shown dislike for Mathematics as a subject have not been able to perform well in the subject because they were not motivated towards the subject. The study revealed further that when learners are motivated through rewards, they may love Mathematics. Such learners would strive to perform well in the subject through reward and motivation. The findings of the present study on learners' extrinsic motivation (reward) for improving Mathematics performance concur with Stafford-Brizard (2016:19) in America who found that motivated learners display moderate and acceptable behaviour in classroom works and work hard for higher grades. Also, motivated learners become more attentive in class; seek additional information in respect of the subject, and make positive attempt to overcome difficulties. The study further revealed that absenteeism was a poor attitude that has made learners not to perform well. It was also suggested by the learners that when learners are motivated; they will be more regular at school; they would attend Mathematics class at all times,

learners would also be able to learn and understand the subject for a better performance to be achieved. The findings of the present study on extrinsic motivation (reward) for improving Mathematics performance concur with Rammala (2009:19) in South Africa who established that learners that must do well in Mathematics must make up their mind to be regular in the Mathematics classwork and shun truancy. The study further revealed that when learners are motivated, they would strive to overcome fear and anxiety in Mathematics. This has been a problem causing Mathematics failure over the years. It was further established that once learners can overcome fear and anxiety, Mathematics success would be more achievable. The finding of the current study on extrinsic motivation (reward) concurs with Lukowski et al. (2016:56) in America who established that Mathematics anxiety is a negative attitude and a major cause of learners' poor academic performance which may be eliminated as much as possible when learners are motivated.

In the next section, the conclusion of data presentation, analysis and discussions are presented.

4.9 CONCLUSION

This chapter presented, analysed and discussed the findings of the present study on Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, in South Africa. The subsequent chapter presents the summary, conclusion and recommendations of the study.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

The main aim of the present study was to establish the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa. Previous chapter discussed the data analysis and discussion of findings of the study. The present chapter presents the summary of study, conclusion and recommendations for improving Grade 9 learners' academic performance in Mathematics in Tshwane municipality. In this same chapter, a proposed model to improve the academic performance of Grade 9 learners in Mathematics is presented. Issues regarding further research and final comments are also presented.

The following section presents the review of the research problem.

5.2 REVIEW OF THE RESEARCH PROBLEM

Chapter 1 revealed that the present study was informed by international and local studies that the previous studies that have been done confirmed that Mathematics performance had remained a major challenge to learners in the secondary school. Studies from America (Wright & Ellis, 2019:34; Holdren, 2013:2; Hanushek & Woessmann, 2009:115; Mullis et al., 2008:71), Europe (Sawatzki & Sullivan, 2018:1360; Budinski & Milinkovic, 2017:56; DeJarnette & Gonzales, 2016:36), Asia (Maldivian Ministry of Education, 2019:100), Namibia (Mateya et al., 2016:158); Gambia (Tomita & Savrimootoo, 2016:17); Nigeria (Aremu & Sokan, 2003:368) and South Africa (Yenmez et al., 2017:320; Naidoo & Ranchod, 2018:20; Reddy et al., 2016:5; DoE, 2014:34,35; Mullis et al., 2012:255; SNAP, 2014:31) revealed that Mathematics is a subject of global importance, yet learners have not been finding it easy to pass the subject.

Previous researchers on the perceptions of factors influencing South African learners in Mathematics such as Reddy et al. (2012:256, 2017:41, 2016:5); Tachie and Chireshe (2013:67); Feza-Piyose (2012:65); Naidoo & Ranchod, (2018:20) and Simkins (2010:1) also indicated that South African learners have actually been performing poorly academically in Mathematics due to certain perceived factors in their environment, homes, schools, teacher related factors and learner's self-concept. These perceived factors have negatively affected learners' performance in

Mathematics. Chapter 1 also highlighted that Mathematics as a subject of global importance was a necessity for the secondary learners to be able to achieve the global technological feat required of South Africa as a nation (Naidoo & Ranchod, 2018:20; Simkins, 2010:1). It has been highlighted that, to the knowledge of the researcher, from studies done in South Africa on Mathematics performance, there were no major studies carried out on Grade 9 learner's perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality. The present study specifically dwelt on attempting to establish Grade 9 learners' perceptions of factors influencing their Mathematics performance in Tshwane municipality.

The next section presents the summary of related literature.

5.3 RELATED LITERATURE

The summary of related literature is presented according to sub-research questions of the present study.

5.3.1 Learners' peer relationship and academic performance

Studies have shown that peer relationship among other factors influencing academic performance has been seen as a major problem influencing secondary school learners' academic performance in Mathematics (Rambaran et al., 2017:525; Sentse et al., 2017:1015). The reviewed literature revealed that learners who experienced poor peer relationship may experience poor academic performance (Van et al., 2016:63; Elicker et al., 2018:77; Llorca et al., 2017:3; Kremer & Levy, 2008:195; Kadir et al., 2018:78; Filade et al., 2019:83). Some studies have also perceived peer relationship as having no influence on secondary learners' academic performance in Mathematics. Such studies are in Europe (Black, 2002:33; Roiki, 2019:5), America (Hwang et al., 2016:137; Honicke & Broadbent, 2016:117; Ryan, 2015:114; Kirk, 2014:78; Angrist, 2014:105; Willson et al., 2008:1116; Hoxby & Weingarth, 2006:215), Europe (Ozsoy et al., 2009:163; Alsop & Watts, 2003:1044), Asia (Najmi et al., 2018:101; Yee, 2010:681), Tanzania (Mosha, 2017:19) and Nigeria (2016: 35).

5.3.2 Learners' home background relationship and academic performance

Learners' home background has been seen as a subject of great concern in learners' academic performance. The reviewed literature revealed that the home background relationship which includes variables such as parental support, parents' level of education, family size, family type has an influence on learners' academic performance in Mathematics (Jeynes, 2017:883; Ravitch, 2016:87) in America, (Radhika, 2019:31; Kudari, 2016:32) in India, (Adetayo & Kiadese, 2011:22; Uwaifo, 2008:122; Odeyemi, 2019:24) in Nigeria and (Muola, 2010:215) in Kenya. Some other studies further established that learners from poor homes experience difficulty in their academic performance when their basic needs are not met (Odeyemi, 2019:24; Page, 2016:24). It is believed that South African learners who have good home background relationship and parental support may experience a degree of motivation for better academic performance in Mathematics. Some studies have also established that home background has been perceived as not having any influence on learners' academic performance. Such studies are in America (Marschall & Shah, 2016:56; Tobin, 2013:120), Kenya (Muola, 2010:215) and Nigeria (Alade & Idowu, 2017:7).

5.3.3 Teacher-learner relationship and academic performance

Teacher-learner relationship has been perceived to be a subject of great concern necessary for successful academic performance among learners. The reviewed literature revealed that the teacher-learner relationship has been perceived as a major influence on the secondary learners' academic performance in Mathematics (Cantor et al., 2018:5; Ruzek et al., 2016:95; Pianta et al., 2012:375; Skinner et al., 2008:775; Vegas & Petrow, 2008:210) in America, (Srinivas & Venkatkrishnan, 2016:49; Juvonen et al., 2012:393) in Europe, (Lei et al., 2018:1; Longobardi et al., 2016:994; Sfard, 2016:43) in Asia, (Ochieng et al., 2017:45; Waseka & Simatwa, 2016:73; Yara, 2009:366) in Kenya, and (Adu & Oladuntun, 2007:59) in Nigeria. Teachers are perceived as the 'midwives' of any educational system in relation to teacher-learner relationship. Some studies have also established that teacher-learner relationship has been perceived as having no influence on learners' academic performance in Mathematics. Such studies are in America (Kim et al., 2018:4; Rivkin et al., 2005:12).

5.3.4 Learners' school environment and academic performance

School environment has been viewed among the notable factors influencing learners' academic performance. The reviewed literature revealed the roles of the school environment on learners' academic performance in Mathematics. Poor school environment has taken its toll on the academic performance of learners generally in Mathematics (Byoung-Suk et al., 2017:36; Benbenishty et al., 2016:188; Caskey et al., 2016:106; Kudari, 2016:34; Oselumese et al., 2016:12; Semali et al., 2016:54; George & Adu, 2018:138; Maniraho, 2017:38). In addition, a defective school environment where there are no adequate learning materials and physical facilities has been perceived as detrimental to the health and academic performance of learners (Othoo et al., 2019:395; Odeh et al., 2015:4918). Overcrowded classroom has also been perceived as a major predictor of poor academic performance among learners (Tshewang et al., 2017:280; Jacob et al., 2016:10; Oselumese et al., 2016:12; George & Adu, 2018:138). Furthermore, it is believed that a conducive school environment has been perceived as an essential catalyst to motivate learners' academic performance in Mathematics. Some studies also established that school environment has been perceived as having no influence on learners' academic performance in Mathematics, such studies are in America (George et al., 2018:323; Fredricks et al., 2016:2; Lawson & Masyn, 2015:68) and China (George et al., 2018:325).

5.3.5 Learners' attitude and academic performance

Learners' attitude and academic performance regarding Mathematics has been perceived as a significant factor influencing learners' academic performance in Mathematics (Middleton et al., 2017:669). The reviewed literature on learners' attitude in Mathematics revealed a strong degree of influence on learners' academic performance in Mathematics, such as studies in America (Bowen & McPherson, 2016:85; Jacoby-Senghor et al., 2016:51), Asia (Radhika, 2019:31; Maat & Zakaria, 2010:17), Europe (Bramlett & Herron, 2009:44; Manoah et al., 2011:965; Kogce et al., 2009:291), Nigeria (Serin & Mohammadzadeh, 2008:67; Oluwatelure & Oloruntegbe, 2010:102) and Ghana (Mensah et al., 2013:134). All these studies support that a moderate and acceptable behaviour of learners in the Mathematics class when motivated may make learners to be more attentive in class and make positive attempt to overcome difficulties in the subject (Stafford-Brizard, 2016:19; Lukowski et.al., 2016:56; Radhika, 2019:31; Mensah et al., 2013:134). Some studies have also established that learners' attitude has been perceived as not having any influence

on learners' academic performance in Mathematics, such studies are in America (Willson et al., 2008:1116), Europe (Ozsoy et al., 2009:163) and Asia (Najmi et al., 2018:101).

The next section presents the summary of research methodology.

5.4 RESEARCH METHODOLOGY

The present study used a positivism paradigm which dwells on thoughts of objective reality (Creswell, 2008:243, Greener, 2008:34). Also, the present study used a quantitative approach, where the questionnaire was divided into two sections, the Likert type scale, with some closed questions which was analysed quantitatively using SPSS and a section on open ended questions for perceived strategies on the improvement of learners' performance, which were analysed deductively. A descriptive survey study design was also adopted in order to establish the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics. The quantitative approach was mainly used since it was the best for a larger population, it emphasises objectivity, description, interpretation and deals with the learners' perceptions and meanings. Besides, it captures many respondents within a short period of time, and it is cost efficient (Patten & Newhart, 2018:24; Chireshe, 2006:87). The sample was made up of 400 participants who were Grade 9 learners. The instrument for data collection was a self-administered learners' questionnaire on perceived factors on academic performance in Mathematics. Ethical issues were considered in the study. Data were presented descriptively, analysed quantitatively and in narrative forms.

The following sub-section presents a summary of the findings of the present study.

5.5 SUMMARY OF THE FINDINGS

The summary of findings is presented according to the sub-research questions of the study.

5.5.1 Sub-research question 1: To what extent do Grade 9 learners perceive peer relationship is influencing their academic performance in Mathematics in Tshwane municipality?

The findings of the sub-research question 1 reveals that there was no significant relationship of the perceptions of peer relationship on Grade 9 learners academic performance in Mathematics. The learners perceived peer relationship as having no influence on their academic performance in Mathematics in the current study. It was revealed by the learners from the study that peer relationship and academic performance had a weak link; hence, peers were perceived unimportant to influencing their studies. The Grade 9 learners perceived that they can handle their academic tasks in Mathematics regardless of their peers. It was further revealed from the study that the learners perceived that they do not have to depend on their peers for academic success. Rather, they are able to motivate themselves towards a better academic performance through independent learning. It was also discovered that the learners perceived that peer relationship influence was stronger among students of higher institutions and not among secondary school learners. It was revealed from the study that peer relationship does not focus on learners' academic activities, but focused on antisocial behaviour outside the school and not academic achievement.

5.5.2 Sub-research question 2: To what extent do Grade 9 learners perceive home background is influencing their academic performance in Mathematics in Tshwane municipality?

The findings of the sub-research question 2 reveals that there was no significant relationship of the perceptions of home background relationship on Grade 9 learners' academic performance in Mathematics. Home background was perceived by the learners as having no influence on their academic performance in Mathematics in the present study. It was revealed that Grade 9 learners' parents' financial status was not perceived as a reason that is strong enough to hamper their academic success. It was revealed that Grade 9 learners' parents were not financially buoyant enough to provide for their children's educational needs, especially the single-parent homes. Some of the learners could cope with the little they had. In a similar vein, learners whose parents were not educated did not depend on their parents for their home works or school assignments, but they had a way of helping themselves out after school, possibly with their classmates who were better in a group learning exercise and still performed well in their studies. Similarly, it was revealed in the study that there are many learners who do not have parents in their different households, yet they performed well academically.

5.5.3 Sub-research question 3: To what extent do Grade 9 learners perceive teacher-learner relationship is influencing their academic performance in Mathematics in Tshwane municipality?

The findings of the sub-research question 3 reveals that there was a significant relationship of the perceptions of teacher-learner relationship on Grade 9 learners' academic performance in Mathematics. Teacher-learner relationship was perceived by the learners as having influenced their academic performance in Mathematics due to the negative and unfriendly attitude of their teachers. The study established that situations where teacher-learner relationship is in the negative direction, learners tend to perform poorly in their studies. This situation influences Grade 9 learners' Mathematics performance negatively. It was revealed by the learners in the study that a positive teacher-learner relationship has been seen to bridge gaps between teachers and learners, which has positively influenced learners' academic performance, but this was not so with Grade 9 learners in Tshwane municipality. It was further perceived by the learners that when teachers put the learners' background, emotional needs and relationship into consideration, some learners may be able to improve on their performances. Most Grade 9 learners have performed poorly in Mathematics due to their teachers' neglect of their emotional needs. It was further perceived by the learners in the study that cordial teacher-learner relationship adequately helps and encourages learners in their studies. Teacher-learner relationship of Tshwane Grade 9 learners was not cordial enough, and this has been negatively influencing Grade 9 learners in their Mathematics performance.

5.5.4 Sub-research question 4: To what extent do Grade 9 learners perceive school environment is influencing their academic performance in Mathematics in Tshwane municipality?

The findings of the sub-research question 4 reveals that there was a significant relationship of the perceptions of school environment on Grade 9 learners' academic performance in Mathematics. School environment was perceived by the learners to be influencing their academic performance in Mathematics. It emerged from the study that learners perceived that lack of conducive school environment has a major influence on Grade 9 learners' academic performance. It was established in the study that the learners perceived that their classrooms are in a deplorable condition. The deplorable state of their classrooms has poorly influenced their academic performance in Mathematics. Furthermore, learners perceived that conducive school environment can motivate

better Mathematics performance in learners. It also emerged from the study that learners perceived that overcrowded classrooms may contribute to their poor performances in Mathematics. Learners in the study also perceived that when classrooms are too rowdy and overcrowded, learners may not be attentive to learning instructions and this also affects the teachers. Physical structures of the classroom, such as partitions were also perceived by learners as poorly placed, thereby resulting into noise interference from the other classes while Mathematics lesson was in progress. The learners also perceived that the poor physical classroom structure was also impeding effective teaching in the classroom. It was further revealed in the present study that learners perceived that when there are poor and inadequate school infrastructures, the school is seen as being hostile. This may contribute to learners absenting themselves from school as a result of the compromised safety of the learners within the school, which is capable of affecting learners' academic performance in Mathematics.

5.5.5 Sub-research question 5: To what extent do Grade 9 learners perceive learners' attitude is influencing their academic performance in Mathematics in Tshwane municipality?

The findings of the sub-research question 5 reveals that there was a significant relationship of the perceptions of learners' attitude on Grade 9 learners' academic performance in Mathematics. Learners' attitude was perceived by the learners as having an influence on their academic performance in Mathematics. It emerged from the present study that learners' perceptions of their attitude towards Mathematics performance was negative. The present study also revealed that the learners perceived that most learners lacked self-confidence and motivation; as a result, they have been performing poorly in Mathematics. It was also revealed that learners perceived that the negative opinion within some learners that Mathematics is not a useful subject has been responsible for their poor Mathematics performance. It was further revealed from the study that learners perceived that learners' perception about Mathematics is that the subject is extremely difficult and consist of several procedures. This made the learners to believe that Mathematics as a subject cannot be passed. It was also perceived by the learners that learners' Mathematics anxiety was equally responsible for their failure in the subject. In addition, learners who absented themselves frequently from school were perceived to have performed poorly. In addition, learners

who do not attend Mathematics classes obviously would not know what was learnt and cannot perform well in the subject.

5.5.6 Sub-research question 6: What are the perceived strategies for improving the Grade 9 learners' academic performance in Mathematics in Tshwane municipality?

It was revealed by learners in the present study that the Grade 9 learners' performance in Mathematics could be improved through a peer mentor-mentee strategy amongst the learners. It is believed that when learners are cordial and friendly with one another as classmates, they may be paired with better learners in Mathematics who could expose them to ways of solving mathematical problems. Through the peer mentor-mentee strategy, they may be able to influence other struggling poor learners in Mathematics. It was also established in the present study that familial-cum-socioeconomics adjustment of parents could build a strong emotional security and support for the learners. Furthermore, the educated parents would be adequately involved in their children's homework, which is a source of encouragement. It was also suggested that socioeconomic adjustment of parents would improve the income level of parents. This may make the parents to be capable of meeting the educational and personal needs of their children. This may also keep the learners stable psychologically and be willing to learn.

It was further suggested in the present study that teaching effectiveness must be in place in order to promote cordial and friendly teacher-learner relationship, thereby enabling learners to relate well with their teachers. Teachers, on their own part, could improve on their teaching effectiveness (teaching methodology) through regular in-service training from time to time. Teachers may also learn to be patient with learners which is also linked to teaching effectiveness strategy. It was further suggested in the present study that school plants management strategy must be put in place. School plants management strategy will make learners' school environment to be conducive for learning. Adequate classrooms would also be provided to control rowdiness and overcrowded classrooms, with all necessary amenities in place. It was further suggested in the present study that learners must be extrinsically motivated (reward). This could help learners to develop a positive attitude towards Mathematics as a subject, thereby, showing more interest and willingness to improve in the subject. Learners who are extrinsically motivated would be regular at school and

Mathematics class lessons. This will further enable learners to improve their performances in Mathematics.

The next section presents the conclusion of the present study.

5.6 CONCLUSION

The focus of the present study was to establish the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa. From the findings of this study, it can be concluded that learners' perceptions of teacher-learner relationship was rated the most dominant of all the perceived factors that negatively influenced the Grade 9 learners' performance in Mathematics, followed by the school environment and learners' attitude that were also perceived factors that significantly influenced the Grade 9 learners' academic performance in Mathematics. However, it can also be concluded that learners' perceptions of peer relationship did not influence Grade 9 learners' performance in Mathematics. The findings also indicated that learners' perceptions of home background relationship did not influence Grade 9 learners' performance in Mathematics.

5.7 LIMITATIONS OF STUDY

The limitations in the course of this study were: 1.The certainty level of truthfulness or otherwise of the respondents in responding to the questionnaires may be seen as a limitation; 2.The study was limited to a municipality in a province of South Africa and the result may therefore not be generalized to all municipalities in South Africa.

The next section presents the recommendations.

5.8 RECOMMENDATIONS

In the present study, a number of recommendations were made by the researcher based on the findings of the present study and the review of related literature. The recommendations are in tune to some extent with the best practices and policies that may improve Grade 9 learners' performance in Mathematics in Tshwane municipality, South Africa.

5.8.1 Policy

This study recommends that a policy may be put in place to activate the alertness and seriousness of Grade 9 learners about Mathematics as a subject of major concern. There is a need for learners to be exposed to the reality and importance of Mathematics as a subject of global importance needed for South African economic and national growth. The idea of maths numeracy may be replaced with Mathematics as a core subject that may be learnt by the learners at all secondary school level. Most learners have hidden themselves under the maths numeracy concept, and this may have grossly brought Grade 9 learners' Mathematics performance to a very poor state. The policy may make it compulsory and binding on all learners to pass Mathematics at a credit level before they could be promoted to the next class. If the policy would be put in place, learners may be more serious about their Mathematics performance.

5.8.2 Practice

5.8.2.1Training teachers

The study recommends that Grade 9 learners' Mathematics teachers in Tshwane municipality may be required to undergo an in-service training from time to time. If the training could be put in place, it may expose the teachers to arrays of methods capable of assisting them in teaching Mathematics effectively and improving on their relationship with learners.

5.8.2.2 Parents giving adequate care and attention to their children

Parents of Grade 9 learners may be required to adequately take care of their children, by providing for their basic and academic needs. The provision of these needs may make the learners to be emotionally and psychologically stable. This may make room for learners' alertness and readiness to learn as well.

5.8.2.3 Provision of additional classrooms and infrastructures

Government and non-government agencies may come to the aid of ailing schools in the area of infrastructural decay, in order to give learners a sense of safety in the school environment. Adequate classrooms may also be built to avert congestion in the few available classrooms. When these infrastructures are in place, it may help learners to learn comfortably, with little or no distractions.

5.8.2.4 Attitude of learners

The study recommends that if parents and schools can inculcate and model right and positive attitudes into the learners through school programmes organised from time to time, learners' performance in Mathematics may be improved. If parents make it an obligation to instill the right attitude towards Mathematics into their wards by creating time to encourage them in solving mathematical problems and assisting them where possible, the learners may improve their Mathematics performance. Furthermore, if parents and teachers adequately motivate learners, learners will cultivate an attitude of making themselves present in school and Mathematics lessons at all times, learners may also improve their Mathematics performance. When this is done, learners may be able to show likeness for the subject.

5.9 A MODEL FOR IMPROVING THE ACADEMIC PERFORMANCE OF THE GRADE 9 LEARNERS' ACADEMIC PERFORMANCE IN MATHEMATICS IN TSHWANE MUNICIPALITY, SOUTH AFRICA

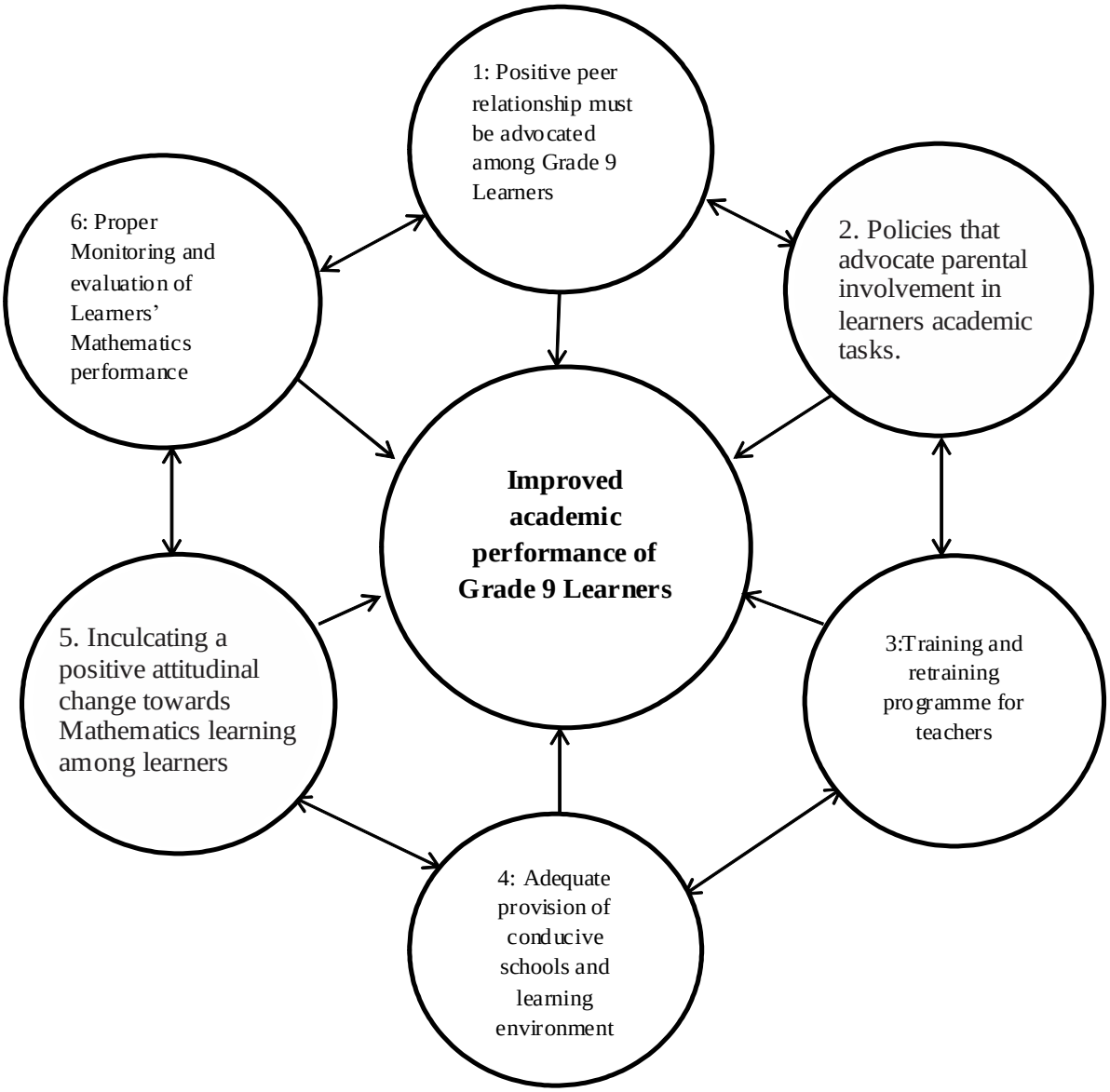

Figure 5.1: A proposed model by B.S.D. Odeyemi (2020) for improving Grade 9 learners' academic performance in Mathematics.

The model for improving academic performance of Grade 9 learners in Tshwane municipality is proposed by B.S.D. Odeyemi to drive the adoption of the presented recommendations. The model

is a reflection of the suggestions from the participants in the study, literature and the theoretical framework (Bandura's Social Cognitive Theory) that guided this study. A contextualised study of problems encountered by a group of individuals in a social setting is a thorough and firm approach that attends to the details of learning process and circumstances surrounding effective learning, which represent the relationship between the Grade 9 learners' performance and their environment. The model will give room for policies that can be monitored to ensure effectiveness of the suggested strategies for improving Grade 9 learners' performance in Mathematics.

All variables in the model are connected together, and as such, none of the variables can be treated separately. This is an indication that the suggested strategies for improving academic performance in Mathematics may not work effectively if the variables in the model are not implemented as a whole. The problems addressed in the model are basically environmental and societal issues that have affected learners' academic performance in Mathematics from a global perspective. The suggested strategies in the model will stand as a panacea to be applied in the field of academic performance to ameliorate the perceived factors that have been influencing Grade 9 learners' performance in Mathematics in Tshwane municipality, South Africa.

COMPONENT 1: Positive peer relationship must be advocated among Grade 9 learners

The model advocates that positive peer relationship would enhance learners' academic performance when a positive peer relationship is developed among learners. Furthermore, learners whose relationships are cordial are able to model a positive academic performance to his or her peers. Although, the study findings did not consider peer relationship as significant to the Tshwane Grade 9 learners' academic performance in Mathematics, but some of the learners in their responses to the open ended questions still considered it as important. Also, peers' interactive processes in Social Cognitive Theory are strong mechanism for effective learning, especially where there is peer acceptance (Zimmerman, 2003:10). Studies have also established that when academically weaker learners are paired with the brilliant ones, the weaker learners are able to improve on their academic performances (Ammermueller & Pischke, 2009:318; Beiswenger & Grolnick, 2010:370; Deci et al., 2006:318; Duflo et al., 2009:321). Cordial relationship among peers is essential to improving Grade 9 learners' performance in Mathematics and the school authorities require a follow up on the policy for its effectiveness.

COMPONENT 2: Policies advocating parental involvement in learners' academic tasks at home

The performances of the Grade 9 learners in Mathematics may be enhanced when policies that may compel parents to be actively involved in their children's academic activities is in place. Although, the study findings did not consider parental involvement under home background relationship as significant to the Tshwane Grade 9 learners' academic performance in Mathematics, but some of the learners in their responses to the open ended questions also deemed it as important. It is also a clear evidence that the influence of the family on a child cannot be overlooked since parents in the family are the first contact of the learners (Ravitch, 2016:87; Uwaifo, 2008:122). This is in accordance with the Social Cognitive Theory of learning guiding the present study, which describes the family as the child's immediate source of learning. Also, learners whose parents are deeply involved in their academic activities are perceived as high achievers (Niklas et al., 2016:55; Li & Qiu, 2018:91). Policies compelling parents to be actively involved in their children's work will also go a long way in helping learners academically in accordance with the Social Cognitive Theory of learning which emphasises a strong dependence of learners on their parents at home. In addition, parents of Grade 9 learners should endeavour to be part of their children's academic success by creating time to guide them in their Mathematics home works, knowing fully that these learners are at their formative stage of making choices of subjects, therefore the learners need help.

COMPONENT 3: Training and re-training programme for teachers

It is recommended that for learners to achieve reasonable academic performance in Mathematics, there is a need for highly trained teachers. Trained teachers are able to explore and expose the learners to arrays of methods of teaching and simple mathematical techniques. Furthermore, learners are helped in learning Mathematics in a better and a more simplified way through these methods that the teachers are exposed to in the course of the training and re-training programme. School authorities are further encouraged to make provisions for the training of teachers from time to time in order to enhance more knowledge and teaching skills. This is in accordance with the Social Cognitive Theory of learning guiding the present study, which describes the role of teachers in learners' studies as very crucial to their academic performance because teachers are seen as role models through their relationship with the learners. Learners need well trained teachers that are

able to impact knowledge and model positive attitudes necessary for better academic performance into them (Srinivas & Venkatkrishnan, 2016:49).

COMPONENT 4: Adequate provision of conducive school environment, infrastructures and services

The proposed model advocates that the school environment is required to be adequately furnished in order to have a safer learning environment for the learners. Also, a healthy school environment where noise is minimised or avoided will promote effective teaching and learning in Mathematics; it will also make learners to feel comfortable during classroom activities (Benbenishty et al., 2016:188; Byoung-Suk et al., 2017:36). The Social Cognitive Theory of learning guiding the present study states that individuals learn from their social environment, therefore such environment must be enabled and conducive for effective learning. The government may also need to build more classrooms in schools and provide more educational resources such as textbooks and stationeries to help learners that are vulnerable. The school authorities may also need to make provision for a Guidance and Counselling unit that can help learners in making the right choices of academic decisions.

COMPONENT 5: Inculcating positive attitudinal change in learners towards Mathematics

The proposed model advocates that learners need to cultivate a positive attitudinal change necessary for better academic performance in Mathematics. Learners may have to understand the need to change their ways of thinking about Mathematics as a difficult subject or as a subject of little importance. Parents, teachers and other stakeholders may also need to motivate learners by rewarding them where necessary, thereby fostering a positive attitudinal change in the learners. This is in accordance with the Social Cognitive Theory which underpins the present study that individual perceptions and attitude are often linked to learning experiences through the environment. The way individuals feel about a thing goes a long way to determine their actions (Williams & Finnegan, 2003:40). In addition, regular attendance of Mathematics class is a major step to understanding and loving the subject, thereby improving their performance in the subject. Furthermore, when learners' attitude towards Mathematics is geared in a positive direction, learners' Mathematics performance may be improved.

COMPONENT 6: Proper monitoring and evaluation of learners' Mathematics performance

Monitoring and evaluation of learners' performance may require that adequate measures be put in place to track the progress of learners from time to time (Burns, 2011:212). Monitoring will further help in keeping record of weaknesses of learners in Mathematics so as to improve the teaching-learning process where and when necessary. Monitoring and evaluation of learners' performance in Mathematics will also give room for adequate concentration and seriousness to studies from the learners; this is capable of assisting the learners to improve their performances. Monitoring and evaluating learners' progress can also be made weekly; this will get the learners aware that their progress is being monitored (National Center on Student Progress Monitoring, 2012:12). The essence of evaluation is to further determine the extent of achievement of the intended educational goals set on the achievement of quality performance in Mathematics (Fletcher & Vaughn, 2009:32). Resources provided for learners to improve their Mathematics performance must also be adequately evaluated to know the appropriateness of the instructional materials and resources. All the components in this model requires effective monitoring and evaluation in order to facilitate the desired improvement of Grade 9 learners' performance in Mathematics.

The next section presents the contribution of the study.

5.10 CONTRIBUTION OF THE STUDY

The present study is the first of its kind to investigate the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, in South Africa from the Grade 9 learners' experiences and point of view in a natural situation. The study adopted a sound approach that was able to capture and examine situational factors such as peer relationship, home background, school and classroom environment, teacher–learner relationship and learners' attitude towards Mathematics which may be influencing Grade 9 learners' Mathematics performance. Despite the limitations associated with this study in Chapter 1, this present study has been able to make a significant contribution to knowledge by generating evidences on the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa.

The body of knowledge on the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, in South Africa is enriched. This study

towards the improvement of Tshwane municipality Grade 9 learners' academic performance in Mathematics will serve as an eye opener to most learners, teachers, parents and other stakeholders on the perceived challenges of the Grade 9 learners in Mathematics. The study will also serve as an opportunity for different stakeholders in education to adapt the proposed model employed in this study for the improvement of the Grade 9 learners' academic performance in Mathematics.
In the next section, the recommendations of the present study for future research are presented.

5.11 RECOMMENDATIONS FOR FUTURE RESEARCH

The present study focused on eight secondary schools in Tshwane municipality in South Africa in order to establish the possibility of generalising the findings of the study. An in-depth study on the perceived factors influencing Grade 9 learners' performance in Mathematics was carried out in South African secondary schools with the intension of finding an enduring solution to these perceived factors influencing Grade 9 learners' performance in Mathematics. A more elaborated study of all South African secondary school learners and comparative studies between other African and developed countries can be done to ascertain if the same situation in South Africa prevails in other countries.

The next section presents the final comment.

5.12 FINAL COMMENTS

The study has successfully established the Grade 9 learners' perceptions of factors influencing their academic performance in Mathematics in Tshwane municipality, South Africa. The experiences of both male and female Grade 9 learners in the study revealed the perceived factors influencing their academic performance in Mathematics. The academic performance of Grade 9 learners in Mathematics was established to be influenced by a set of variables such as teacher-learner relationship which was perceived as not cordial enough towards the learners. The school environment and learners' attitude were the perceived critical factors that influenced the Grade 9 learners' academic performance in Mathematics. The study further suggested possible strategies for improving the Grade 9 learners' academic performance in Mathematics. The suggested strategies were centered on the government, teachers, parents, schools and the learners. A strong

emphasis was placed on training and retraining of teachers, provision of conducive school environment and learning resources, adequate monitoring and evaluation of learning resources and the Grade 9 learners' performance in Mathematics from time to time.

REFERENCES

Adekola, B.O. (2012). *Home and social factors as determinants of students' achievement in senior secondary schools English comprehension in four South Western States*, Nigeria. Ph.D Thesis, Olabisi Onabanjo University, Ago Iwoye, Nigeria.

Adesokan, R.O & Makura, A.H. (2020). Perceived effects of single-mother parenting on students' academic performance in selected high schools in Free State, South Africa. *INTED2020 Proceedings,* pp. 1943-1947.

Adetayo, Janet O. & Kiadese, Adeola L. (2011). Emotional Intelligence and Parental Involvement as Predictors of Students' Achievement in Financial Accounting. *American Journal of Social and Management Sciences,* 2 (1) 21-25.

Adeyefa, A.S. (2012). Under-achievement of learners in Mathematics due to perversion in methodology: the case of quadratic equation. *Journal of Mathematics Education,* 2(5), 123-130.

Adu E. O., & Olatundun, S.O. (2007). Teachers' Perception of Teaching as Correlates of Students' Academic Performance in Oyo State Nigeria. *Essays in Education,* 20, 57-63.

Alade, O.M. & Idowu, R.A (2017). Study habits, locus of control and Self-Efficacy as Correlates of Academic Achievement among Undergraduate Students of University of Lagos, Nigeria. *Asia-Pacific Collaborative Education Journal.* 13(2), 5-14.

Alsop, S., &Watts, M. (2003). Science education and affect. *International Journal of Science Education,* 25, 1043-1047.

Andreas Ammermueller & Jorn-Steffen Pischke, (2009), Peer Effects in European Primary Schools: Evidence from the Progress in International Reading Literacy Study, *Journal of Labor Economics*, 27, (3), 315-348.

Angrist. J. D., (2014). "The Perils of Peer Effects." *Labour Economics,* 30, 98-108.

Aremu, A.O. & Sokan, B. O. (2003). *A multi-casual evaluation of academic achievement of Nigeria learner, issues* and *implication for national development.* Millennium Ibadan: Macmillan Nigeria Ltd.

Arends. F, Winnaar. L. & Mosimege. M. (2017). Teacher classroom practices and Mathematics performance in South African schools: A reflection on TIMSS 2011. *South African Journal of Education,* 37, (3), 1-11.

Aydogan Yenmez, A., Erbas, A.K., Alacaci, C., Cakiroglu, E. & Cetinkaya, B. (2017). Evolution of mathematics teachers' pedagogical knowledge when they are teaching through modeling. *International Journal of Education in Mathematics, Science and Technology (IJEMST),* 5(4), 317-332.

Baldwin, C., Baldwin, A., Sameroff, A., & Seifer, R. (1989, April). The role of family interaction in the prediction of adolescent competence. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Kansas City, MO.

Baltes, P. B., & Reese, H. W. (1984). The life-span perspective in developmental psychology. In M. H. Bornstein & M. E. Lamb (Eds.), Developmental psychology: An advanced textbook (pp. 493-531). Hillsdale, NJ: Erlbaum.

Bandura, A. (1997). Self-efficacy: The exercise of control. New York: Freeman.

Bandura, A., (1986). Social foundations of thought and action: a social cognitive theory. (1986), Englewood Cliffs, N.J: Prentice-Hall.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology,* 52, 1-26.

Bandura, A. (2011). *Social cognitive theory. Handbook of social psychological theories*, 349- 373.
Bandura, A. (2007). Self-efficacy: towards a unifying theory of behaviour change. *Psychological Review,* 84: 191-215.
Bassey, W.S, Umoren, G. & Udida, L.A. (2008). Cognitive styles, secondary school students' attitude and academic performance in Chemistry in Akwa Ibom State-Nigeria. http://academicdirect.or
Bed Raj Acharya (2017). Factors affecting difficulties in learning mathematics by mathematics learners. *International Journal of Elementary Education* 6 (2), 8-15.
Beiswenger, K. L., & Grolnick, W. S. (2010). Interpersonal and intrapersonal factors associated with autonomous motivation in adolescents' after-school activities. *Journal of Early Adolescence*, 30, 369–394.
Black, S. (2002). When students push past peer influence. *The Education Digest,* 68, 31-36.
Bosman. A & Schulze. S. (2018). Learning style preferences and Mathematics achievement of secondary school learners. *South African Journal of Education,* 38(1), 1-8.
Bowen, William G. & Michael S. McPherson. (2016). Lesson Plan: An Agenda for Change in American Higher Education. Princeton, NJ: Princeton University Press.
Bower, G. H. (1975). Cognitive psychology: An introduction. In W. K. Estes (Ed.), *Handbook of learning and cognition* (pp. 25-80). Hillsdale, NJ: Erlbaum
Brady, H.E. & Collier, D. (2004). Rethinking Social Inquiry: Diverse Tools. Shared Standards. Rowman Littlefield, Berkeley.
Bramlett, D. C. & Herron, S. (2009). A study of African-American College students' attitude towards mathematics. *Journal of Mathematical Sciences & Mathematics Education,* 4(2), 43-51.
Brown, B. B., & Klute, C. (2003). Friends, cliques, and crowds. In G. R. Adams & M. D. Berzonsky (Eds.), *Blackwell handbook of adolescence* (pp. 330–348).
Budinski, N. & Milinkovic, D. (2017). Transition from Realistic to Real World Problems with the Use of Technology in Elementary Mathematical Education. *Acta Didactica Napocensia*. 10. 53-62.
Buhs, E. S., Ladd, G. W., & Herald, S. L. (2006). Peer exclusion and victimization: Processes that mediate the relation between peer group rejection and children's classroom engagement and achievement? *Journal of Educational Psychology*, 98, 1-13.
Burns, M.K. (2011). Matching math interventions to students' skill deficits a preliminary investigation of a conceptual and procedural heuristic. *Assessment for Effective Intervention.* 36, 210-218.
Burns, N, Grove SK (2005). *The Practice of Nursing Research*: Conduct, Critique, and Utilization. Fifth edition. Elsevier /Saunders, St Louis MO.
Byoung-Suk.K, Ellis.C.D, Junga. L. & Jacobs. K. (2017). The link between school environments and student academic performance. *Urban Forestry & Urban Greening,* 23, 35-43.
Carnoy, M. & Arends, F. (2012): "Explaining Mathematics Achievement Gains in Botswana and South Africa", *Quarterly Review of Comparative Education,* 42(4), pp. 453-468.
Carter, P., & Darling-Hammond, L. (2016). Teaching diverse learners. In D.H. Gitomer, & C. Bell (Eds.). Handbook of research on teaching (5th ed., pp. 593-638). Washinton, DC: American Educational Research Association.
Caskey, N., Cerna, R., Hanson, T., Polik, J., & Houten, L. (2016). *School climate improvement toolkit*. San Francisco, CA: WestEd.

Charles Gbollie & Harriett Pearl Keamu. (2017). Student Academic Performance: The Role of Motivation, Strategies, and Perceived Factors Hindering Liberian Junior and Senior High School Students Learning: *Hindawi Education Research International.* Volume 2017, Article ID 1789084, 11 pages.

Chen, X., Chang, L., & He, Y. (2003). The peer group as a context: Mediating and moderating effects on relations between academic achievement and social functioning in Chinese children. *Child Development,* 74, 710-727.

Cherrington, A. M., & De Lange, N. (2016). "I want to be a hope champion!" Research as hope intervention with rural South African children. *Journal of Psychology in Africa,* 26(4), 373-378.

Chinyoka, K. & Ganga, E. (2010). An Exploration of Psychological Effects of Poverty on Child Development in Ngundu in Zimbabwe. NAWA. *Journal of Language and Communication.* 4 (1), 154-178.

Chireshe, R. (2006). An assessment of the effectiveness of school guidance and counselling services in Zimbabwean secondary schools. D.Ed. Thesis in Psychology of Education, University of South Africa, Pretoria.

Chirinda, B. & Barmby, P. (2018). South African Grade 9 mathematics teachers' views on the teaching of problem-solving. *African Journal of Research in Mathematics, Science and Technology Education*, 22(1), 114–124.

Chowdhury. M. (2016). Emphasizing Morals, Values, Ethics, And Character Education In Science Education And Science Teaching *The Malaysian Online Journal of Educational Science,* 4(2), 1-16.

Ciani, K. D., Middleton, M. J., Summers, J. J., & Sheldon, K. M. (2010). Buffering against performance classroom goal structures: The importance of autonomy support and classroom community. *Contemporary Educational Psychology,* 35, 88–99.

Codjoe, H. M. (2007). The role of an affirmed black cultural identity and heritage in the academic achievement of African-Canadian students. *Intercultural Education,* 17(1), 33-54.

Cohen, L, Manion, L. & Morrison, K. (2011). Research methods in education. 7th Edition. London: Routledge.

Cohen, J., Pickeral, T. & McCloskey, M. (2009). Assessing school climate. *Education Digest,* 74 (8), 45-48.

Cohen, J., McCabe, E., Michelli, N., & Pickeral, T. (January, 2009). School climate: Research, policy, practice, and teacher education. *Teachers College Record,* 111 (1), 180-213.

Creswell, J. (2008:243). *Educational research*: planning, conducting and evaluating quantitative and qualitative research (3rd Ed.). Upper Saddle River, NJ: Pearson Prentice Hall.

Cunha, F., Heckman, J. & Schennach, S. (2010): "Estimating the Technology of Cognitive and Noncognitive Skill Formation", Working Paper, National Bureau of Economic Research, Cambridge.

Currin, E. (2019). "In Loco Parentis Redux". *In Loco Parentis Redux*. Leiden, The Netherlands: Brill | Sense.

Danielsen. A.G, Wiium, N, Wilhelmsen, B.U & Wold, B. (2010) Perceived support provided by teachers and classmates and students' self-reported academic initiative. *Journal of School Psychology,* 48 (3) (2010), pp. 247-267.

Darling-Hammond, Lisa Flook, Channa Cook-Harvey, Brigid Barron & David Osher. (2020). Implications for educational practice of the science of learning and development, *Applied Developmental Science,* 24(2), 97-140.

Davis, A.K. (2020). Bathroom Battlegrounds: how Public Restrooms Shape the Gender Order. University of Carlifonia Press. Oakland, Carlifonia.

Davis, M. & Sutton, C.D. (2004). *Social Research: The Basics*. London: Sage Publications.

Dearing, E., Kreider, H., Simpkins, S., & Weiss, H. B. (2006). Family involvement in school and low-income children's literacy: Longitudinal association between and within families. *Journal of Educational Psychology,* 98,653–664.

Deci, E. L., La Guardia, J. G., Moller, A., Scheiner, M. J., & Ryan, R. M. (2006). On the benefits of giving as well as receiving autonomy support: Mutuality in close friendships. *Personality and Social Psychology Bulletin,* 32, 313–327.

Dejarnette.A.F & Gonzalez.G. (2016). Thematic analysis of students' talk while solving a real world problem in geometry. *Linguistics and Education* 35:37-49.

Department of Basic Education. (2018). *Report on the* Education Statistics in South Africa for 2016, DBE (June 2018).

Department of Basic Education. (2018). Strategies to improve school management and governance in schools. DBE (2018).

Department of Basic Education. (2012). *Education Statistics in South Africa 2010*.

Department of Basic Education. (2011). Annual National Assessments (ANA) – *Report on the Annual National Assessments of 2011,* DBE (June 2011).

Department of Basic Education. (2014). Annual National Assessments (ANA) – *Report on the Annual National Assessments of 2013,* DBE (December 2014).

Department of Education (DoE) (2008b). Education System Priorities for 2009. *MTEC. Presentation to MTEC Hearing.*

Deslandes, R., Barma, S., & Morin, L. (2015). Understanding complex relationships between teachers and parents: Two case studies. *International Journal about Parents in Education,* 9(1), 131–144.

Dweck, C. S. (2017). Mindset (2nd ed.). New York: Brown, Little Book Group.

Duflo, E., P. Dupas, and M. Kremer. (2009): Peer effects, pupil-teacher ratios, and teacher incentives: evidence from randomized evaluation in Kenya, Unpublished manuscript, Massachusetts Institute of Technology, Cambridge, ME.

Effandi, Zakaria & Normah Yusoff. (2009). Attitudes and Problem-solving Skills in Algebra among Malaysian College Students. *European Journal of Social Sciences*, 8: 232-245.

Ekdahl, A.L., Venkat, H., Runesson, U., & Askew, M. (2018). Weaving in connections: Studying changes in early grades additive relations teaching. *South African Journal of Childhood Education,* 8(1), 1–9.

El Nokali, B. E., Bachman, H. J., & Votruba-Drazl, E. (2010). Parent involvement and children's academic and social development in elementary school. *Child Development,* 8(3), 988-1005.

Erion, J. (2006). *Parent tutoring*: A meta-analysis. Education and Treatment of Children, 79-106.

Ferlazzo, L. (2015). Helping students motivate themselves; practical answers to classroom challenges, 10, 33-37.

Feza-Piyose N. (2012). Language: A cultural capital for conceptualizing mathematics knowledge. *International Electronic Journal of Mathematics Education*, 7(2): 62-79.

Filade, B. A., Bello, A. A., Uwaoma, C. O., Anwanane, B. B., & Nwangburuka, K. (2019). Peer group influence on academic performance of undergraduate students in Babcock University, Ogun State. *African Educational Research Journal*, 7(2): 81-87.

Fletcher JM, Vaughn S. (2009). Response to intervention Preventing and remediating academic difficulties. *Child Development Perspectives.* 3:30-37.

Fredrick O. Ogola; Paul M. Maithya; Rael Makungu. (2018). Causes of father absence and how it affects academic performance of the boy child in KCSE in Suneka Division, KISII County, Kenya. Maasai Mara University Institutional Repository.

Fredricks, J. A., Filsecker, M., & Lawson, M. A. (2016). Student engagement, context, and adjustment: Addressing definitional, measurement, and methodological issues. Learning and Instruction, 43, 1–4.

Gehlbach, H, Brinkworth, M.E, King, A.M, Hsu, L.M, McIntyre, J, Rogers, T. (2016). Creating birds of similar feathers: Leveraging similarity to improve teacher-student relationships and academic achievement. *Journal of Educational Psychology*, 108(3), 342-352.

George. G. Bear, Chunyan Yang, Dandan Chen, Xianyou He, Jia-Shu Xie, Xishan Huang (2018). Differences in school climate and student engagement in China and the United States. *School Psychology Quarterly* 33(2), 323, 2018.

George. A & Adu. E.O. (2018). Motivation and Attitude of Grade Nine Learners Towards Mathematics in King Williams Town Education District, South Africa. *Ghana Journal of Development Studies*, 15(1), 135-150.

George, R. (2006): "A Cross-domain Analysis of Change in Students' Attitudes toward Science and Attitudes about the Utility of Science" *International Journal of Science Education,* 28(6), 571-589.

Gray, D.E. (2009). *Doing research in the real world*. 2nd Edition. London: Sage Publications.

Greener, S. (2008*). Business research methods*.Ventus Publishing ApS.

Gregory, A., & Weinstein, R. S. (2004). Connection and regulation at home and in school: Predicting growth in achievement for adolescents. *Journal of Adolescent Research.* 19, 405–427.

Gunderson, E. A., Sorhagen, N. S., Gripshover, S. J., Dweck, C. S., Goldin-Meadow, S., & Levine, S.C. (2017). Parent praise to toddlers predicts fourth grade academic achievement via children's incremental mindsets. *Developmental Psychology.* 121, 101–110.

Hadwin, A.F., Winne, P. H., Stockley, D.B., Nesbit, J.C., & Woszezyna, C. (2001). Context moderates students' self-report about how they study. *Journal of Educational Psychology*, 93, 477-487.

Hajovsky. D.A, Oyen, K.A, Chesnut, S.R & Curtin, S.J. (2020). Teacher-student relationship quality and math achievement: The mediating role of teacher self- efficacy. *Psychology in the Schools.* 57(1), 111-134.

Hamad. K. A. (2018). Understanding the Situation of Learner Autonomy within the Context of Higher Education in Kurdistan-Iraq. Unpublished PhD Thesis. University of Exeter. January 2018.

Hanushek, Eric A., & Alfred A. Lindseth. (2009). *Schoolhouses, courthouses, and statehouses:* Solving the funding-achievement puzzle in America's public schools. Princeton, NJ: Princeton University Press.

Harré, R., & Gillet, G. (1994). *The discursive mind*. Thousand Oaks, Calif.: Sage.

Hassan, G. (2008): "Attitudes toward science among Australian tertiary and secondary school students" *Research in Science &Technological Education.* 26(2), pp. 129-147.

Hawkes, J., & Marsh, W. (2004). *Discovering Statistics* (2nd ed.). Charleston, SC: Hawkes Publishing Inc.

Higgs, P. (2016). The African renaissance and the transformation of the higher education curriculum in South Africa. *Africa Education Review,* 13(1), 87-101.

Hoeg, D.G & Bencze, J. L. (2017). Values underpinning STEM education in the USA: An analysis of the Next Generation Science Standards. *Science Education.* 101 (2), 278-301.

Holdren, J. (2013). Federal Science, Technology, Engineering, and Mathematics (STEM) Education Strategic Plan. A Report from the Committee on STEM Education National Science and Technology Council.

Honicke, T., & Broadbent, J. (2016). The influence of academic self-efficacy on academic performance: A systematic review. *Educational Research Review*. 17, 63–84.

Hoxby, Caroline & G. Weingarth. (2006). *Taking Race Out of the Equation*: School Reassignment and the Structure of Peer Effects.

Hwang, M. H., Choi, H. C., Lee, A., Culver, J. D., & Hutchison, B. (2016). The relationship between self-efficacy and academic achievement: A 5-year panel analysis. *Asia-Pacific Education Researcher*. 25(1), 89–98.

HSRC (2011). The 2011 Grade 3 and 6 Verification Annual National Assessment report.

Huitt, W. (2011). *A holistic view of education and schooling: Guiding students to develop capacities, acquire virtues, and provide service*. Paper presented at the 12th Annual International Conference sponsored by the Athens Institute for Education and Research (ATINER), May 24-27, Athens, Greece.

Idowu, R.A., & Oluwole, B.A. (2014). Effects of Student-Teacher Ratio on Academic Achievement of Selected Secondary School Students in Port Harcourt Metropolis, Nigeria. *Journal of Education and Practice.* 5(24), 100-105.

Jacob, O. A, Olawuyi B. O. & Jacob, A. J. (2016). Relationship between class size and discipline of secondary school students in Yagba West of Kogi State, Nigeria. *Sky Journal of Educational Research.* 4(1). Pp. 8-13.

Jacoby-Senghor, Drew S., Stacey Sinclair, & J. Nicole Shelton. (2016). "A Lesson in Bias: The Relationship Between Implicit Racial Bias and Performance in Pedagogical Contexts." *Journal of Experimental Social Psychology*. 63: 50–55.

Jankowski, Natasha A. (2017). Unpacking Relationships: Instruction and Student Outcomes. Washington, DC: *American Council on Education*.

Jeynes, W. (2012). A meta-analysis of the efficacy of different types of parental involvement programs for urban students. *Urban Education*. 47(4), 706-742.

Jeynes, W. H. (2017). The relationship between parental involvement and urban secondary school student academic achievement a meta-analysis. *Urban education, 42(1),* 82-110.

Jia, Y., Konold, T. R., & Cornell, D. (2016). Authoritative school climate and high school dropout rates. *School Psychology Quarterly*. 31, 289–303.

Johan Lithner (2011) University Mathematics Students' Learning Difficulties, *Education Inquiry*, 2:2, 289-303.

Johnson, D.W., Johnson, R.T., & Smith, K.A. (2014). Cooperative learning: Improving university instruction by basing practice on validated theory. *Journal on Excellence in College Teaching.* 25, 85-118.

Juvonen, J., Espinoza, G., & Knifsend, C. (2012). *The role of peer relationships in student academic and extracurricular engagement*. In S. Christenson, A. Reschly, & C. Wylie (Eds.), Handbook of research on student engagement (pp. 387–401). New York, NY: Springer Science.

Kadir, H., Atmowardoyo, H. and Salija, K. (2018). The influence of peer groups on students' anxiety in efl Learning. *ELT Worldwide*, 5(1) 78.

Kaiser. G. (2020). Mathematical Modelling and Applications in Education. In: Lerman S. (eds). Encyclopedia of Mathematics Education. Springer, Cham.

Kang, C., (2007). Classroom Peer Effects and Academic Achievement: Quasi Randomization Evidence from South Korea. *Journal of Urban Economics*. 61, 458-495.

Karande, S. & Kulkarni, M. (2005). Poor School Performance. *The Indian Journal of Pediatrics.* Vol. 75: 961-967.

Kaur, B., Tay, E.G., Toh, T.L, Leong, Y.H & Lee, N.H. (2018). A study of school mathematics curriculum enacted by competent teachers in Singapore secondary schools. *Mathematics Education Research Journal*, 30,103-116.

Kazmi, S. H., Sajjid, M. & Pervez, T. (2011). Parental style and academic achievement among the students. *International Journal of Academic Research.* 3(2).

Khalil, M., & Saar, V. (2009). Then classroom learning environments as perceived by students in Arab elementary schools. *Learning Environments Research.*12, 143-156.

Kim, L. E., Dar-Nimrod, I., & MacCann, C. (2018). Teacher personality and teacher effectiveness in secondary school: Personality predicts teacher support and student self-efficacy but not academic achievement. *Journal of Educational Psychology.* 110(3), 309–323.

Kirk, A.J (2014). Beating peer pressure our guide to teen advice. California: Advice Book.

Kogce, D., Yıldız, C., Aydın, M. & Altındag, R., (2009). Examining Elementary School Students' Attitudes towards Mathematics in Terms of Some Variables, *ProcediaSocial and Behavioral Sciences.* 1(1), 291-295.

Kolb, B., & Whishaw, I. Q. (1998). Brain plasticity and behavior. *Annual Review of Psychology,* 49, 43-64.

Kreider, H., & Suizzo, M.-A. (2009). Adolescent development and family involvement. In L. Shumow (Ed.), Promising practices for family and community involvement during high school (pp. 9–25). Charlotte, NC: Information Age Publishing.

Kremer, M., Levy, D., (2008), Peer Effects and Alcohol Use among College Students. *Journal of Economics Perspective.* 22(3), 189-206.

Kudari, J.M. (2016). Survey on the Factors Influencing the Student's Academic Performance. *International Journal of Emerging Research in Management and Technology,* 5(6), 30-36.

Kwatubana, S. & Makhalemele, T. (2015). Parental involvement in the process of implementation of the National School Nutrition Programme in Public Schools. *International Journal of Educational Sciences,* 9(3):315-323.

Lacour, M. & Tissington, LD. (2011). Educational research and reviews. *Academic Journals,* 6(7): 522-527.

Ladd, G. W., Herald-Brown, S. L., & Kochel, K. P. (2009). *Peers and motivation.* In K. Wentzel & A. Wigfield (Eds.), Handbook of motivation in school (pp. 323–348). Mahwah, NJ: Erlbaum.

Landau, A. (2002). *Peer groups and educational outcomes*. Retrieved October 24, 2016, from http://inside.bard.edu/academic/specialproj/darling/bullying/group2/alison.html

LaTorre, Donald R.; Kenelly, John W.; Biggers, Sherry S.; Carpenter, Laurel R.; Reed, Iris B.; Harris, Cynthia R. (2011). *Calculus Concepts: An Informal Approach to the Mathematics of Change*. Cengage Learning. p. 2.

Lawson, M. A., & Masyn, K. E. (2015). Analyzing profiles, predictors, and consequences of student engagement dispositions. *Journal of School Psychology*, 53, 63–86.

Lei H, Cui Y & Chiu MM (2018). The Relationship between Teacher Support and Students' Academic Emotions: A Meta-Analysis. *Frontiers in Psychology*. 8:2288.

Levey EJ, Oppenheim CE, Lange BC, Plasky. NS, Harris BL, Lekpeh GG, Kekulah I, Henderson DC & Borba CPC. (2017). A qualitative analysis of parental loss and family separation among youth in post-conflict Liberia. *Vulnerable Child Youth Stud*. 12(1), 1-16.

Li, Z. & Qiu, Z.J. Chin. (2018). Family background, academic performance and admission to postgraduate study in China. *Chinese Journal of Sociology* 36 (3), 86-109.

Llorca. A, Richaud. M.C & Malonda, E (2017). Parenting, Peer Relationships, Academic Self-efficacy, and Academic Achievement: Direct and Mediating Effects. *Frontiers in Psychology*. 8:2120.

Longobardi. C., Prino. L. E., Marengo. D, Settanni. M. (2016). Student-Teacher Relationships As a Protective Factor for School Adjustment during the Transition from Middle to High School. *Frontiers in Psychology*. 7, pg. 1988.

Lukowski S. L., Ditrapani J., Jeon M., Wang Z. J., Schenker V., Doran M. M. (2016). Multidimensionality in the measurement of math-specific anxiety and its relationship with mathematical performance. *Learn. Indiv. Diff.* 70, 229–235.

Levpuscek, M. P. & Zupancic, M., (2009). Math Achievement in Early Adolescence: The Role of Parental Involvement, Teachers' Behaviour, and Students' Motivational Beliefs About Math: *The Journal of early adolescence.* 29:541.

Maasik, S. & Solomon, J. (2003). We've come a long way, maybe: Gender codes in American culture, in Signs of life in the USA: Readings on popular culture for writers. New York: St. Martin's: 475-483.

Maat, S. M. B. & Zakaria, E. (2010). The learning environment, teacher's factor and students' attitude towards mathematics amongst engineering technology students. *International Journal of Academic Research*, 2(2), 16- 20.

Mateya. M, Utete. C.N & Ilukena. A.M. (2016). Factors that cause poor performance in mathematics at National School Secondary Certificate level in four selected schools in the two Kavango Educational regions. *Journal for Studies in Humanities and Social Sciences.* 5(2), 158-168.

Mackenzie, N. & Knipe, S. (2006). Research dilemmas: paradigms, methods and methodology. *Issues in Educational Research*, 16, 1-15.

Madsen, J.J. (2016) STAMATS: Communications, Inc. (Buildings, Smarter facility management). https://www.stamats.com.

Mafukata, M. (2016). Complexities and Constraints Influencing Learner Performance in Physical Science. *International Journal of Research in Business and Social Science. (2147-4478)*, 5(1), 30-46.

Maniraho. J. F & Mugabo L.R (2019). Grade Six Learners' Performance in Mathematics: A Comparison between Rwanda, Botswana and South Africa. *Journal of Research Innovation and Implication in Education.* 3(1), 7-22.

Manoah SA, Indoshi FC, Othuon, LOA, (2011), 'Influence of attitude on performance of students in mathematics curriculum', *Educational Research.* 2(3), pp. 965-981, ISSN: 2141-5161.

Manzo, K. (2008, March 19). Motivating students in the middle years. *Education Week*. 27(28), pp. 22-25.

Marais. P. (2016) "We can't believe what we see": Overcrowded classrooms through the eyes of student teachers. *South African Journal of Education*. 36(2), May 2016.

Martin. A.J. & Elliot. A.J. (2016). The role of personal best (PB) goal setting in students' academic achievement gains. *Learning and Individual Differences*. 45, 222-227.

Mathias, W. (2009). Educate the girl child to have the nation empowered. http://children'sclub.wordpress.com/about/.

Mattingly, D. J., Prislin, R., McKenzie, T. L., Rodrigues, J. L., & Kayzar, B. (2015). Evaluating evaluations: The case of parent involvement programs. *Review of Educational Research.* 72(4), 549-576.

Mbugua, Z. K., Kibet, K., Muthaa, G.M. & Nkonke, G.R. (2012). Factors contributing to learners' poor performance in mathematics at Kenya Certificate of Secondary Education in Kenya: A case of Baringo County, Kenya. *American International Journal of Contemporary Research.* 2(6): 87-91.

McMillan, J.H. & Schumacher, S. (2010). *Research in education: Evidence-based inquiry* (7th ed.). New York, NY: Pearson.

McMillan, J.H. & Schumacher, S. (2006). *Research in education: Evidence-based enquiry*. New York: Pearson.

Meggitt, C. & Walker, J. (2007). An introduction to child care and education. 2nd Edition. London: Hodder Arnold.

Mensah, J.K., Okyere, M. & Kuranchie, A. (2013). Student attitude towards Mathematics and performance: Does the teacher attitude matter? *Journal of Education and Practice.* 4(3), 132-139.

Michael Stevenson, John G. Hedberg, Kerry-Ann O'Sullivan & Cathie Howe (2016). Leading learning: the role of school leaders in supporting continuous professional development, *Professional Development in Education.* 42:5, 818-835.

Middleton, J. A., Jansen, A., & Goldin, G. A. (2017). The complexities of mathematical engagement: Motivation, affect, and social interactions. In Jinfa Cai (Ed.), *Compendium for research in mathematics education.* (pp. 667-699). Reston, VA: National Council of Teachers of Mathematics.

Mildred. L. Patten & Michelle Newhart (2018). Understanding Research Methods: An Overview of the Essentials. Tenth edition published. New York: Routledge.

Ministry of Education (2019). Secondary school completion examinations. Retrieved on 3 July 2020 fromhttp://www.moe.gov.mv/

Mji, A. & Mkgato, M. (2006). Factors associated with high school learners' poor performance: A spotlight on mathematics and physical science. *South African Journal of Education.* 26(2): 253- 266.

Mji, A. & Mbinda, Z. (2005). Exploring high school science students' perceptions of parental involvement in their education. *Psychological Reports*. 97:235-336.

Mohd, N., Mahmood, T. F. P., & Ismail, M. N. (2011). Factors that influence students in mathematics achievement. *International Journal of Academic Research.* 3(3), 49-54.

Mosha, M. (2017). The influence of peer group on academic performance of adolescent students in secondary schools in Tanzania. *Research Journal of Educational Studies and Review.* 3 (1), 18-26.

Moyo T.S. (2011). Parental involvement and academic achievement. Harare: Zimbabwe Open University.

Mudau.T.J, Ncube, D & Mukansi. L. E. (2018).The effects of single parenting on raising teenagers: a case study of the Hasani Dakari village Vhembe district in Limpopo province, South Africa. *Gender and Behaviour.* 2(16). 11728 – 11739.

Mullis, Ina V. S., & Michael O. Martin. (2019). *TIMSS & PIRLS: Findings from IEA's International Mathematics and Science Study at the fourth and eighth grades*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.

Mullis, Ina V. S., Michael O. Martin, & Pierre Foy. (2008). *TIMSS 2007 International mathematics report:* Findings from IEA's Trends in International Mathematics and Science Study at the fourth and eighth grades. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.

Mullis I.V.S, Martin M.O, Foy, P & Arora, A. (2012). *TIMSS 2011 International Results in Mathematics.* Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Muola, J. M. (2010). A Study of the Relationship between academic achievement motivation and home environment among standard eight pupils. In *Educational Research and Reviews.* 5(5), 213-217.

Murphy, M, Redding, S. & Twyman, J. S. (2016). The Handbook on Personalized Learning for States, Districts, and Schools 1-311. Center on Innovations in Learning, Temple University, Philadelphia, PA.

Murphy, P. F. (2009). *Relationships of Parenting Practices, Independent Learning, Achievement, and Family Structure:* Dissertation submitted to the Faculty of Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Educational Research and Evaluation.

Murugan, A. L. R. (2013). *Students' perceptions of mathematics classroom environment and mathematics achievement: A study in Sipitang, Sabah, Malaysia.* Paper presented at the International Conference on Social Science Research, ICSSR 2013, Penang, Malaysia.

Nachamias, C. F & Nachamias, D. (1996). Research methods in the Social Sciences 5th Edition. New York: St. Martin's Press.

Naidoo, R. & Ranchod, R. (2018). Transformation, the state and higher education: Towards a developmental system of higher education in South Africa. In: *Higher Education Pathways, South African Undergraduate Education and the Public Good.* Cape Town, South Africa: African Minds.

Najmi, A, Raza, S.A, Qazi, W. (2018). Does statistics anxiety affect students' performance in higher education? The role of students' commitment, self-concept and adaptability. *International Journal of Management in Education.* 12 (2), 95-113.

National Center on Student Progress Monitoring. (2012). How progress monitoring works.

Neisser, U. (1976). Cognition and reality: Principles and implications of cognitive psychology. San Francisco: Freeman.

Neuman, W. L. (2006). Qualitative and quantitative approaches. 4 Edition. Boston: Allyn and Bacon.

Niklas, F., Tayler, C., & Schneider, W. (2015). Home-based literacy activities and children's cognitive outcomes: A comparison between Australia and Germany. *International Journal of Educational Research*. 71, 75–85.

Ntekane. A. (2018). Parental Involvement Education. 10.13140/RG.2.2.36330.21440.

Ochieng. K. R, Kiplagat. P, Nyongesa. S. (2017). Influence of Teacher Competence on Mathematics Performance in KCSE Examinations Among Public Schools in Nyatike Sub county, Migori County Kenya. *International Journal of Secondary Education.* 4(5), 44-57.

Odeh. R. C, Oguche, O. Angelina & Ivagher, Ezekiel Dondo, **(**2015**).** Influence of school environment on academic achievement of students in secondary schools in Zone "A" Senatorial district of Benue State, Nigeria. *Journal of Recent Scientific Research.* 6(7), 4914-4922.

Odeyemi, B.S.D. (2019). Impact of Single Parenthood on Adolescents' Academic Performance on Secondary Students, Ogun State, Nigeria. *Asia-Pacific Collaborative Education Journal.* 15(1), 23-38.

Oganisation of Economic Corporation and Development (OECD), (2020). *PISA 2018 Worldwide Ranking- Average score of mathematics, science and reading.* USA.

Olalekan, A. (2016). Influence of peer group relationship on the academic performance of students in secondary school (a case study of selected secondary school in Atiba local government area of Oyo state). *Global Journal of Human Social Science: Arts & Humanities Psychology*. 16(4), 35.

Oluwatelure, T.A. & Oloruntegbe, K.O. (2010). Effects of parental involvement on students' attitude and performance in science. *African Journal of Microbiology Research.* 4, 1-9.

Orlando, M (2013). Nine characteristics of a great teacher: Philosophy of teaching.

Oselumese, I., Omoike, D., & Andrew, O. (2016). Environmental Influence On Students' Academic Performance In Secondary School. *International Journal of Fundamental Psychology and Social Sciences (IJFPSS)*. 6(1), 10-14.

Osher, D., Kidron, Y., Brackett, M., Dymnicki, A., Jones, S., & Weissberg, R.P. (2016). Advancing the science and practice of social and emotional learning: Looking back and moving forward. *Review of Research in Education.* 40(1), 644–681.

Othoo, H.A; Olel, M.A; Gogo, J. (2019). Financial Resources as Determinants of Academic Performance in Public Secondary Schools in Kuria East and Kuria West Sub-Counties, Kenya. *American Journal of Social Sciences and Humanities.* 4(2), 392- 406.

Otieno, K. O. & Yara, P. O. (2010). Teaching/learning resources and academic performance in mathematics in secondary schools in Bondo District of Kenya, Kampala International University. *Asian Social Science.* 6(12): 126 – 132.

Page, R. D. (2016). The role that parents play in their children's academic progress at a previously disadvantaged primary school in Cape Town. University of the Western Cape.

Papanastasiou, C. (2008). A Residual Analysis of Effective Schools and Effective Teaching in Mathematics. *Studies in Educational Evaluation.* 34, 24-30.

Park, D., Gunderson, E. A., Tsukayama, E., Levine, S. C., & Beilock, S. L. (2016). Young children's motivational frameworks and math achievement: Relation to teacher-reported instructional practices, but not teacher theory of intelligence. *Journal of Educational Psychology*. 108, 300–313.

Perera, L.D.H., Bomhoff, E.J. & Lee, G.H.Y. (2014): "Parent's attitudes towards science and their children's science achievement". *Discussion Paper,* Monash University, Malaysia.

Phillips, D. C., & Burbules, N. C. (2000). Post positivism and educational research. Lanham, MD: Rowman & Littlefield.

Pianta, R. C., Hamre, B. K., & Allen, J. P. (2012). Teacher-student relationships and engagement: Conceptualizing, measuring, and improving the capacity of classroom interactions. In S.

Christenson, A. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement* (pp. 365–386). New York, NY: Springer Science.
PISA (2018). OECD programme for International Student Assessment (PISA). Retrieved on 5 July 2020 from http://www.pisa.oecd.org/
Plous, S. (2013). Psychology headline tips on informed consent. http//www.socialpsychology.org./consentform.htm.
Polit D.F., Tatano Beck C, Hungler BP (2001). *Essentials of Nursing Research*: Methods, Appraisal, and Utilization. Fifth edition. Lippincott, Williams and Wilkins, Philadelphia PA.
Polit D.F., Tatano Beck C, (2006). *Essentials of Nursing Research:* Methods, Appraisal, and Utilization. Sixth edition. Lippincott, Williams and Wilkins, Philadelphia PA.
Potgieter J. (2007). Delictual negligence of educators in schools: the confusing influence of the in loco parentis doctrine. In: Beckmann J (ed.). *Engaging the law and education in a transforming society: a critical chronicle of the South African Law and Policy Association (SAELPA) 1996-2005*. South African Education Law Association.
Qiong, O.U. (2017). A Brief Introduction to Perception. *Studies in Literature and Language*.15 (4), 18-28.
Rapeta. S.J & Magano. M.D. (2017). Supervision of learners with intellectual disabilities in a special school: In loco parentis of teachers as a wellness perspective. *European Journal of social Sciences*, 11 (2) 248-261.
Rambaran, J.A, Hopmeyer A, Schwartz D, Steglish C, Badaly D, Veenstra R. (2017). Academic functioning and peer influences: A short-term longitudinal study of network-behavior dynamics in middle adolescence. *Child Development,* 88(2):523-543.
Ravitch, D. (2016). *The death and life of the great American school system: How testing and choice are undermining education*. New York, NY: Basic Books.
Redmond, B. F. (2010). Self-efficacy theory: do I think that I can succeed in my work? Work Attitudes and Motivation. Pennsylvania State University Website; World Campus.
Reddy, V., Visser, M., Winnaar, L., Arends, F., Juan, A., Prinsloo, C. & Isadale, K. (2016). TIMSS 2015 Highlights of Mathematics and Science Achievement of Grade 9 South African Learners – nurturing Green Shoots.
Richardson. C. & Mishra. P (2018) Learning environments that support student creativity: Developing the SCALE. *Thinking Skills and Creativity*. 27, 45-54.
Rivkin, S. G., E. A. Hanushek, & J. F. Kain (2005): "Variable Definitions, Data, and Programs for 'Teachers, Students, and Academic Achievement'," *Econometrical Supplementary Material*, 73(2).
Roberts, Edgerton, & Peter, (2008). Facility Conditions and Learning Outcomes.
Roiki, J. (2019). Encouraging Students' Independence in Math. George Lucas Educational Foundation. *Edutopia,* 5-14.
Roos, M.C, Oosthuizen, I.J & Smit, M.H. (2009). In Oosthuizen, I. J. (Ed.). *Aspects of education law.* Pretoria: Van Schaik.
Rubin, K. H., Bukowski, W., & Parker, J. G. (2006). *Peer interactions, relationships, and groups.* In W. Damon, R. M. Lerner, & N. Eisenberg (Eds.), Handbook of child psychology: Vol. 3, Social, emotional, and personality development (6th ed., pp. 571–645). New York: Wiley.
Rushidi, J. & Rushidi-Rexhepi, J. (2015). Learner Autonomy in Language Learning: University Students' and Professors' Views and Suggestions. In B. Haferri, M. Waldisphl & B.

Eriksson (Eds.). Promoting learner autonomy in higher education (pp. 113-132), Tetovo: South East European University.

Ruzek, E.A, Hafen, C.A, Allen, J.P, Gregory, A, Mikami, A.Y, Pianta, R.C. (2016). How teacher emotional support motivates students: The mediating roles of perceived peer relatedness, autonomy support, and competence. *Learning and Instruction*. 2016; 42:95–103.

Ryan, S. (2015). Peer stress and adolescent Achievement. Theory and clinical implication. New York: Guilford.

Ryoko Tomita & Tanya Savrimootoo. (2016). *Improving Education Performance in Maths & Science in the Gambia.* An overview of the Progressive Science Initiative and Progressive Math Initiative (PSI-PMI) and its implementation in The Gambia.

Sacerdote, B. (2001). Peer effects with random assignments: Result for Dartmouth roommates. *The quarterly Journal of Economics,* 116 (2): 681-704.

Santrock. J.W, (2014). Child Development: An introduction to family and relationship: New york: Mc Graw-Hill Inc.

Saunders, F, (2009). *Basic of Qualitative Research*: Techniques and Procedures for Developing Grounded Theory, ISBN publishers.

Saunders, M., Lewis, P., &Thornhill, A. (2009*). Research Methods for business students.*Fifth edition. Pearson Education Limited. Printice Hall.

Sawatzki, C., & Sullivan, P. (2018). Teaching students to apply and interpret mathematics in the real world. *International Journal of Science and Mathematics Education*. 16(7), 1355-1373.

Semali, L.M. & Vumilia, P. L (2016). Challenges Facing Teachers' Attempts to Enhance Learners' Discipline in Tanzania's Secondary Schools. *World Journal of Education*. 6(1), 50-67.

Sentse. M, Prinzie, P, Salmivalli, C. (2017). Testing the Direction of Longitudinal Paths between Victimization, Peer Rejection, and Different Types of Internalizing Problems in Adolescence. *J Abnorm Child Psychol*. 45:1013–1023.

Shadrek, M. (2012). Zimbabwean science students' perceptions of their classroom learning environment and attitudes towards science. *Mediterranean Journal of Social Sciences.* 3(11), 415.

Shindler, J., Jones, A., Williams, A., Taylor, C., & Cardenas, H. (January, 2009). Exploring below the surface: School climate assessment and improvements as the key to bridging the achievement gap. Paper presented at the Annual Meeting of the Washington State Office of the Superintendent of Public Instruction, Seattle WA.

Simkins, C. (2010). The maths and science performance of South Africa's public schools: *Some lessons from the past decade*. The Centre for Development and Enterprise. No 1. September 2010.

Snyders, A.R, McLaughlin, & D.K, Findeis J (2006). Household composition and poverty among female-headed households with children: Differences by race and residence. *Rural Sociological Society, 71(4):* 591-624.

Skinner, E. A., Furrer, C. J., Marchand, G. C., & Kindermann, T. A. (2008). Behavioral and emotional engagement in the classroom: Part of a larger motivational dynamic? *Journal of Educational Psychology*. 100, 765–781.

Souza Barros.S. De & Marcos F. E. (2010). Physics: How do they affect the reality of the classroom. *International Journal of Research in Education.* 3(1), 174.

Srinivas, P., & Venkatkrishnan, S. (2016). Factors Affecting Scholastic Performance in School Children. *IOSR Journal of Dental and Medical Sciences.* 15(7), 47-53.

Stafford-Brizard, K.B. (2016). Building blocks for learning: A framework for comprehensive student development. New York: Turnaround for Children.

Stevenson, D.L. & Baker, D.P. (2012). The family-school relation and the child's school performance. *Society for Research in Child Development: Special Issue on Schools and Development.* 58(5): 1348-1357.

Tachie, S. A., & Chireshe, R. (2013). High failure rate in mathematics examination in rural senior secondary schools in Mthatha District, Eastern Cape: Learner's attributions. *Studies of Tribes and Tribals,* 11(1), 67-73.

Tahar, N. F., Ismail, Z., Zamani, N. D., & Adnan, N. (2010). Students' Attitude Toward Mathematics: The Use of Factor Analysis in Determining the Criteria. *ProcediaSocial and Behavioral Sciences,* 8, 476–481.

Tawodzera. M.C., & Themane. M. (2019). Schooling experiences of children left behind in Zimbabwe by emigrating parents: Implications for inclusive education. *South African Journal of Education*. 39(1). 1-13.

Temitope, B. & Ogunsakin, F. (2015). Influence of peer group on academic performance of secondary school students in Ekiti State. *International Journal of Innovative Research & Development.* 4(1), 324.

Tezer, M. & Karasel, N. (2010). Attitudes of primary school 2nd and 3rd grade students towards mathematics course. *Procedia Social and Behavioural Sciences.* 2, 5808-5812.

Tinio, M. F. (2009). Academic engagement scale for grade school students. *The Assessment Handbook,* 2, 64-75.

Topor, D.R, Keane, S.P, Shelton, T.L & Calkins, S.D. (2010). Parent involvement and academic performance: A multiple meditational analysis. *Journal of Prevention & Intervention Community.* 38(3): 183-197.

Tshatshu. U. J. (2016).Strategies to deal with poor learners' safety in the North-West Province Township Secondary Schools: Towards development of a school safety. Unpublished PhD Thesis at Central University of Technology, Free State. South Africa.

Tshewang.R., Chandra. V. & Yeh. A. (2017). Students' and teachers' perceptions of classroom learning environment in Bhutanese eighth-grade mathematics classes. *Learning environment research*. 20(2), 269-288.

Tshwane (2012). South African Cities Network Cities http://www.sacities.net/workwith/tshwane

Ugwuanyi, C.S, Okeke, I.O, Asomugha, C.G. (2020). Prediction of learners' mathematics performance by their emotional intelligence, self-esteem and self-efficacy. *Cypriot Journal of Educational Sciences.* 15 (3), 492-501.

UNESCO. (2003). *Gender and education for all: The leap to equality*. France: UNESCO Publishing.

Uwaifo, VO. (2008). The effects of family structure and parenthood on the academic performance of Nigerian university students. *Studies on Home and Community Science.* 2(2): 121-124.

Uzezi, J. & Deya, G. (2017). Relationship between peer group influence and students' academic achievement in chemistry at secondary school level. *American Journal of Educational Research.* 5(4), 350-356.

Valero, P. (2017). Mathematics for all, economic growth, and the making of the citizen-worker. In T. S. Popkewitz, J. Diaz, & C. Kirchgasler (Eds.). *A political sociology of educational knowledge: Studies of exclusions and difference* (pp. 117-132). New York: Routledge.

Vanderstoep, SW & Johnston, DD. (2009). Research methods for everyday life: Blending qualitative and quantitative approaches. San Francisco: John Wiley and Sons.

Van Hoorn J, Fuligni AJ, Crone EA, & Galván A (2016). Peer influence effects on risk-taking and prosocial decision-making in adolescence: Insights from neuroimaging studies. *Current Opinion in Behavioral Sciences*. 10, 59–64.

Vegas, E., & J. Petrow. (2008). Raising Student Learning in Latin America: The Challenge for the 21st Century. Washington, DC: The World Bank.

Verspoor, A. (2006). The Challenge of Learning: Improving the Quality of Basic Education in Sub Saharan Africa. ADEA, Paris. 1- 276pp.

Wallace, M. (2011). Managing the unmanageable? Coping with complex educational change. *Educational Management and Administration.* 31(1), 9-29.

Wang, M., & Degol, J.L. (2017). Gender Gap in Science, Technology, Engineering, and Mathematics (STEM): Current Knowledge, Implications for Practice, Policy, and Future Directions. *Educ Psychol Rev.* 29, 119-140.

Wang, M.T., & Eccles, J.S. (2012). Social support matters: Longitudinal effects of social support on three dimensions of school engagement from middle to high school. *Child Development.* 83(3), 877-895.

Waseka.E.L & Enose M.W. Simatwa (2016). Student Factors Influencing Academic Performance of Students in Secondary Education in Kenya: A Case Study of Kakamega County. *International Research Journals.* 7(3), 072-087.

Wentzel, K. R. (2017). Peer relationships, motivation, and academic performance at school. In A. J. Elliot, C. S. Dweck, & D. S. Yeager (Eds.), Handbook of competence and motivation: Theory and application (pp.586–603). The Guilford Press.

Wolf, S., & McCoy. D. C. (2019). Household socioeconomic status and parental investments: Direct and indirect relations with school readiness in Ghana. *Child Development.* 90(1), 260-278.

Wolhuter CC & Van Staden JG (2008). Bestaan daar 'n dissiplinekrisis binneSuid Afrikaanseskole? Belewenis van opvoeder. *Tydskrif vir Geesteswetesnskappe*.

Wright. R & Ellis. M. (2019).Where science, technology, engineering, and mathematics (STEM) graduates move: Human capital, employment patterns, and interstate migration in the United States. Population, *Space and Place.* 25(4). Wiley Online Library.

Yara, P. O. (2009). Relationship between teachers' attitude and students' academic achievement in Mathematics in some selected Senior Secondary Schools in South-western Nigeria. *European Journal of Social Sciences.* 11(3), 364-369.

Yee, L. S. (2010). Mathematics Attitudes and Achievement of Junior College Students in Singapore: Hwa Chong Institution. *Mathematics Education Research Group of Australasia*. 36(3) 681-689.

Yilmaz, C., Altun, S. A. & Ollkun, S. (2010). Factors affecting students‟ attitude towards math: ABC theory and its reflection on practice. *Procedia Social Science and Behavioural Sciences.* 2, 4502-4506.

Zindiye, S. (2008). An empirical investigation into the factors affecting the performance of small and medium enterprises in the manufacturing sector of Harare, Zimbabwe. MSc Dissertation. University of Fort Hare, Fort Hare.

Zimmerman, B. J. (2001). *Theories of self-regulated learning and academic achievement: An overview and analysis.* In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement: Theoretical perspectives* (p. 1–37). Lawrence Erlbaum Associates Publishers.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*. 45, 166-183.

Zimmerman, B. J. (2002). *Becoming a self-regulated learner*: An overview. Theory into Practice. 41, 64-72.

Zimmerman, D. J., (2003). "Peer Effects in Academic Outcomes: Evidence from a Natural Experiment," *The Review of Economics and Statistics.* 85(1), 9-23.

Zingiswa Jojo (2019). Mathematics Education System in South Africa, Education Systems Around the World, Gilson Porto Jr., IntechOpen, DOI: 10.5772/intechopen.85325.

APPENDIX A: RESEARCH ETHICS CLEARANCE CERTIFICATE

UNISA university of south africa

UNISA COLLEGE OF EDUCATION ETHICS REVIEW COMMITTEE

Date: 2018/10/17

Ref: **2018/10/17/50930427/08/MC**
Name: Mr BSD Odeyemi
Student: 50930427

Dear Mr Odeyemi

Decision: Ethics Approval from 2018/10/17 to 2023/10/17

Researcher(s): Name: Mr BSD Odeyemi
E-mail address: bsd102002@yahoo.com
Telephone: +234 70 363 10487

Supervisor(s): Name: Prof R Chireshe
E-mail address: chireshe@yahoo.co.uk
Telephone: +263 77 730 8244

Title of research:

Factors influencing Tshwane municipality Grade 9 learners' performance in mathematics, in South Africa

Qualification: D. Ed in Psychology of Education

Thank you for the application for research ethics clearance by the UNISA College of Education Ethics Review Committee for the above mentioned research. Ethics approval is granted for the period 2018/10/17 to 2023/10/17.

*The **medium risk** application was reviewed by the Ethics Review Committee on 2018/10/17 in compliance with the UNISA Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.*

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.

University of South Africa
Preller Street, Muckleneuk Ridge, City of Tshwane
PO Box 392 UNISA 0003 South Africa
Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150
www.unisa.ac.za

2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the UNISA College of Education Ethics Review Committee.
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing.
5. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
6. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data requires additional ethics clearance.
7. No field work activities may continue after the expiry date **2023/10/17**. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

Note:

The reference number **2018/10/17/50930427/08/MC** *should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

Kind regards,

M Claassens

Dr M Claassens
CHAIRPERSON: CEDU RERC
mcdtc@netactive.co.za

pp Prof V McKay

Prof V McKay
EXECUTIVE DEAN
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APPENDIX B

QUESTIONNAIRE FOR TSHWANE GRADE 9 LEARNERS

INSTRUCTIONS

This questionnaire seeks to investigate the factors influencing Grade 9 learners' academic performance in Mathematics in Tshwane Municipality, South Africa. The study is part of my Doctor of Education Degree at the University of South Africa and should help to improve Grade 9 learners' performance in Mathematics in Tshwane Municipality schools, South Africa. You do not need to write your name and no respondent will be identified from this investigation whatsoever as confidentiality and anonymity are guaranteed. All data and information provided by you shall be treated as strictly private and confidential. There are no 'right' and 'wrong' answers. The researcher is only interested in your response. It is therefore requested of you to kindly complete the questionnaire as honestly as you can. Thank you for participating in the current survey.

Serial number

SECTION A: BIOGRAPHICAL INFORMATION

Sex: Male ( ) Female ( )

Age:

13-15yrs	16-18yrs

Grade:

Grade 9

Type of school:

Rural day	Urban day

SECTION B

Please kindly use the keys as guide to tick (√) the option that best expresses your mind about the information below.

The questionnaire will make use of four likert scale listed below

SA= Strongly Agree

A = Agree

D = Disagree

SD= Strongly disagree

Section B:

PEER RELATIONSHIP AND ACADEMIC PERFORMANCE

How much do you agree with the following statements?					
	Statement	**SA**	**A**	**D**	**SD**
1	I have a cordial interaction with my classmates which has helped me in taking Mathematics at all times				
2	My friends laugh at learners who do well in Mathematics				
3	I have friends who are very good in Mathematics and supports me in Mathematics class work				
4	I find it interesting coping with Mathematics when I am with my friends				
5	My friends bully and reject me in the class which affects my Mathematics performance				

Write any comment on your perceptions of peer relationship and learners' Mathematics performance ……

Section C.

HOME BACKGROUND AND ACADEMIC PERFORMANCE

How much do you agree with the following statements?					
	Statement	SA	A	D	SD
1	My parents' education has encouraged my performance in Mathematics				
2	My parents provide for my needs always and I am happy learning Mathematics				
4	My parents help and support me in my Mathematics homework				
5	My parent/guardian has not been showing concern about my Mathematics studies				
6	My parents/guardian are not good in Mathematics and it discourages me				

Write any comment on your perceptions of home background and learners' Mathematics performance……

Section D.

RELATIONSHIP WITH LEARNERS' AND ACADEMIC PERFORMANCE.

How much do you agree with the following statements?					
	Statement	SA	A	D	SD
1	My Mathematics teacher believes that I can perform well in Mathematics				
2	My Mathematics teachers' method of teaching is very difficult				
3	My teacher encourages me to work together with my classmates during Mathematics lesson				
4	My teacher helps me in solving difficulties and problems arising from my Mathematics homework				
5	My teacher gives me extra attention in Mathematics class work				
6	My teacher is very friendly and supportive during Mathematics class				

Write any comment on your perceptions of teachers' relationship and learners' Mathematics performance……

Section E:

SCHOOL ENVIRONMENT AND ACADEMIC PERFORMANCE

How much do you agree with the following statements					
	Statement	SA	A	D	SD
1	My school environment is good for learning Mathematics				
2	Poor school facilities can lead to poor performance in Mathematics				
3	My school climate has helped me in Mathematics performance				
4	My school is too noisy and too crowded for learning Mathematics				
5	The teaching and learning material in my school has motivated me in learning Mathematics effectively				
6	My school have new buildings which makes learning safe in the classroom				

Write any comment on your perceptions of school environment and learners' performance in Mathematics ……

Section F:

LEARNERS' ATTITUDE AND ACADEMIC PERFORMANCE

	How much do you agree with the following statements?				
	Statement	SA	A	D	SD
1	I have self-confidence in Mathematics exercises				
2	I am not afraid of Mathematics as a subject				
3	I hate Mathematics and I am always absent in Mathematics class				
4	I do not enjoy Mathematics as a subject and I don't need it in future				
5	Mathematics is too difficult for me to learn				
6	I am motivated learning Mathematics and I love it				
7	I get nervous when it comes to solving mathematical problems				

Write any comment on your perceptions of learners' attitude and performance in Mathematics ……

Thank you.

APPENDIX C

For admin. use
Ref. no:

GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

GDE RESEARCH REQUEST FORM

REQUEST TO CONDUCT RESEARCH IN INSTITUTIONS AND/OR OFFICES OF THE GAUTENG DEPARTMENT OF EDUCATION

1. PARTICULARS OF THE RESEARCHER

1.1	Details of the Researcher	PASSPORT NUMBER	A 50333490
Surname and Initials:		ODEYEMI, BSD	
First Name/s:		BAMIDELE SEGUN DONALD	
Title (Prof / Dr / Mr / Mrs / Ms):		Mr	
Student Number (if relevant):		50930427	
SA ID Number:		N/A	
Work permit no. (If not SA citizen)		N/A	

1.2	Private Contact Details
Home Address	***Postal Address (if different)***
11, Salamotu Eniola Street, Off, Layi	
Oyekanmi Street, Agiri B/Stop, Opposite	
P&P College. Ilasamaja, Mushin,	
Lagos State, Nigeria	
Postal Code: 100001	***Postal Code:***
Tel: +2347036310487	***Cell:*** +2340825021182
Fax:	***E-mail:*** bsd102002@yahoo.com

1

2. PURPOSE & DETAILS OF THE PROPOSED RESEARCH

2.1	Purpose of the Research (Place cross where appropriate)	
	Undergraduate Study - Self	
	Postgraduate Study - Self	X
	Private Company/Agency – Commissioned by Provincial Government or Department	
	Private Research by Independent Researcher	
	Non-Governmental Organisation	
	National Department of Education	
	Commissions and Committees	
	Independent Research Agencies	
	Statutory Research Agencies	
	Higher Education Institutions only	

2.2	Full title of Thesis / Dissertation / Research Project
	Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, South Africa

2.3	Value of the Research to Education (Attach Research Proposal)
	The research intends to find out the factors influencing Tshwane municipality Grade 9 learners poor perfomance in Mathematics and to proffer possible solutions to the problem in South Africa

2.4	Date
Envisaged date of completion of research in GDE Institutions	January, 2019
Envisaged date of submission of Research Report and Research Summary to GDE:	May, 2019

2.5	Student and Postgraduate Enrolment Particulars	
	Name of institution where enrolled:	University of South Africa
	Degree / Qualification:	Doctor of Education
	Faculty and Discipline / Area of Study:	Psychology of Education
	Name of Supervisor / Promoter:	Prof., Regis Chireshe

2.6	Employer
Name of Organisation:	
Position in Organisation:	
Head of Organisation:	
Street Address:	
Postal Code:	
Telephone Number (Code + Ext):	
Fax Number:	
E-mail:	

2.7	PERSAL Number (GDE employees only)

3. PROPOSED RESEARCH METHOD/S

(Please indicate by placing a cross in the appropriate block whether the following modes would be adopted)

3.1 *Questionnaire/s (If Yes, supply copies of each to be used)*

YES	x 400copies	NO	

3.2 *Interview/s (If Yes, provide copies of each schedule)*

YES		NO	x

3.3 *Use of official documents*

YES	X	NO	
If Yes, please specify the document/s:			
	Learners report card in mathematics		

3.4 ***Workshop/s / Group Discussions (If Yes, Supply details)***

YES		**NO**	**X**

3.5 ***Standardised Tests (e.g. Psychometric Tests)***

YES		**NO**	**X**
If Yes, please specify the test/s to be used and provide a copy/ies			

4. INSTITUTIONS TO BE INVOLVED IN THE RESEARCH

4.1 ***Type and NUMBER of Institutions (Please indicate by placing a cross alongside all types of institutions to be researched)***

INSTITUTIONS		Write NUMBER here
Primary Schools		
Secondary Schools	**X**	8 Schools
ABET Centres		
ECD Sites		
LSEN Schools		
Further Education & Training Institutions		
Districts and / or Head Office		

4.2 Name/s of institutions to be researched (Please complete on a separate sheet if space is found to be insufficient)

Name/s of Institution/s
Montana Poort Secondary School, Montana
Hillview High School , Olievenhoutbosch
Nellmapheus Secondary School , Pretoria East
Laudium Secondary School, Centurion
Lytteton Manor High School,Centurion.
Pretoria Central High School, Pretoria Central
Prosperitus Secondary School,Eesterust Area
Pretoria Secondary School, Pretoria

4.3 District/s where the study is to be conducted. ***(Please indicate by placing a cross alongside the relevant district/s)***

District/s			
Ekurhuleni North		***Ekurhuleni South***	
Gauteng East		***Gauteng North***	
Gauteng West		***Johannesburg Central***	
Johannesburg East		***Johannesburg North***	
Johannesburg South		***Johannesburg West***	
Sedibeng East		***Sedibeng West***	
Tshwane North	X	***Tshwane South***	X
Tshwane West	X		

If Head Office/s (Please indicate Directorate/s)

5

4.4 Number of learners to be involved per school (Please indicate the number by gender)

Grade	1		2		3		4		5		6	
Gender	B	G	B	G	B	G	B	G	B	G	B	G
Number												

Grade	7		8		9		10		11		12	
Gender	B	G	B	G	B	G	B	G	B	G	B	G
Number					25	25						

4.5 Number of educators/officials involved in the study (Please indicate the number in the relevant column)

Type of staff	*Educators*	*HODs*	*Deputy Principals*	*Principal*	*Lecturers*	*Office Based Officials*
Number						

4.6 Are the participants to be involved in groups or individually?

Groups		*Individually*	
			X

4.7 Average period of time each participant will be involved in the test or other research activities (Please indicate time in minutes)

Participant/s	Activity	Time
50	questionnaire	30minutes

4.8 Time of day that you propose to conduct your research.

***Before* school hours**		***During school hours (for limited observation only)***		***After* School Hours**	X

4.9 School term/s during which the research would be undertaken

First Term		***Second Term***		***Third Term***	X

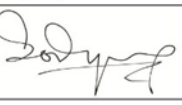
CONDITIONS FOR CONDUCTING RESEARCH IN GDE

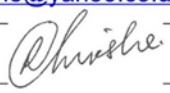
Permission may be granted to proceed with the above study subject to the conditions listed below being met and permission may be withdrawn should any of these conditions be flouted:

1. ***The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter;***
2. ***A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB.)***
3. ***A letter / document that outlines the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned.***
4. ***The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, SGBs, teachers and learners involved. Participation is voluntary and additional remuneration will not be paid;***
5. ***Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal and/or Director must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.***
6. ***Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year. If incomplete, an amended Research Approval letter may be requested to conduct research in the following year.***
7. ***Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.***
8. ***It is the researcher's responsibility to obtain written parental consent and learner;***
9. ***The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.***
10. ***The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.***
11. ***On completion of the study the researcher must supply the Director: Education Research and Knowledge Management with an electronic copy (and a hard copy if possible) as well***

as a Research Summary (on the GDE Summary template) of the completed Research Report;

12. *The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned;*
13. *Should the researcher have been involved with research at a school and/or a district/head office level, the Director and school concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.*

DECLARATION BY THE RESEARCHER	
1. I declare that all statements made by myself in this application are true and accurate.	
2. I accept the conditions associated with the granting of approval to conduct research and undertake to abide by them.	
Signature:	
Date:	24/8/2018
DECLARATION BY SUPERVISOR / PROMOTER / LECTURER	
I declare that: (Name of Researcher)..... Bamidele Segun Donald Odeyemi	
1. is enrolled at the institution / ~~employed by the organisation to which the undersigned is attached.~~	
2. The questionnaires / structured interviews / tests meet the criteria of: • *Educational Accountability;* • *Proper Research Design;* • *Sensitivity towards Participants;* • *Correct Content and Terminology;* • *Acceptable Grammar;* • *Absence of Non-essential / Superfluous items;* • *Ethical clearance*	
3. A hard copy, electronic copy and Research Summary (after completion) will be sent by the researcher to the GDE.	
Surname:	CHIRESHE
First Name/s:	REGIS
Institution / Organisation:	Great Zimbabwe University, Zimbabwe
Faculty / Department (where relevant):	Department of Special Needs Education

Telephone:	**+263777308244**
E-mail:	chireshe@yahoo.co.uk
Signature:	
Date:	24/08/2018

ANNEXURE A: ADDITIONAL INFORMATION FOR GROUP RESEARCH

This information must be completed by every researcher/student who will be visiting GDE Institutions for research purposes.

By signing this declaration, the researcher/students accepts the conditions associated with the granting of approval to conduct research in GDE Institutions and undertakes to abide by them.

Supervisor/ Promoter / Lecturer's Surname and Name Prof. Regis Chireshe.....

DECLARATION BY RESEARCHERS / STUDENTS:

Surname & Initials	Name	Tel	Cell	Email address	Signature
Odeyemi,BSD	Bamidele Segun Donald	+2348025021182	+2347036310487	bsd102002@yahoo.com	

N.B. This form (and all other relevant documentation where available) may be completed and forwarded electronically to Diane.Buntting@gauteng.gov.za and please copy (cc) ResearchInfo@gauteng.gov.za. The last 2 pages of this document must however have the original signatures of both the researcher and his/her supervisor or promoter. It should be scanned and emailed or hand delivered (in a sealed envelope) to Diane Buntting, Room 509, 111 Commissioner Street, Johannesburg. All enquiries pertaining to the status of research requests can be directed to Diane Buntting on tel. no. 011 843 6503.

APPENDIX D

GAUTENG PROVINCE
Department: Education
REPUBLIC OF SOUTH AFRICA

8/4/4/1/2

GDE RESEARCH APPROVAL LETTER

Date:	**19 November 2018**
Validity of Research Approval:	**04 February 2019 – 30 September 2019** **2018/348**
Name of Researcher:	**Odeyemi BSD**
Address of Researcher:	**11 Salamotu Eniola Street, Off, Lay**
	Oyekanmi Street Agric B/Shop, Opposite P&P College.
	Ilasamaja, Mushin Lagos State, Nigeria 100001
Telephone Number:	**+2347036310487 +2340825021182**
Email address:	**bsd102002@yahoo.com**
Research Topic:	**Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane Municipality.**
Type of qualification	**Doctor of Education**
Number and type of schools:	**Eight Secondary Schools**
District/s/HO	**Tshwane North, Tshwane West and Tshwane South.**

Re: Approval in Respect of Request to Conduct Research

This letter serves to indicate that approval is hereby granted to the above-mentioned researcher to proceed with research in respect of the study indicated above. The onus rests with the researcher to negotiate appropriate and relevant time schedules with the school/s and/or offices involved to conduct the research. A separate copy of this letter must be presented to both the School (both Principal and SGB) and the District/Head Office Senior Manager confirming that permission has been granted for the research to be conducted.

The following conditions apply to GDE research. The researcher may proceed with the above study subject to the conditions listed below being met. Approval may be withdrawn should any of the conditions listed below be flouted:

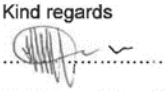
20/11/2018

Office of the Director: Education Research and Knowledge Management
7th Floor, 17 Simmonds Street, Johannesburg, 2001
Tel: (011) 355 0488
Email: Faith.Tshabalala@gauteng.gov.za
Website: www.education.gpg.gov.za

1. *The District/Head Office Senior Manager/s concerned must be presented with a copy of this letter that would indicate that the said researcher/s has/have been granted permission from the Gauteng Department of Education to conduct the research study.*
2. *The District/Head Office Senior Manager/s must be approached separately, and in writing, for permission to involve District/Head Office Officials in the project.*
3. *A copy of this letter must be forwarded to the school principal and the chairperson of the School Governing Body (SGB) that would indicate that the researcher/s have been granted permission from the Gauteng Department of Education to conduct the research study.*
4. *A letter / document that outline the purpose of the research and the anticipated outcomes of such research must be made available to the principals, SGBs and District/Head Office Senior Managers of the schools and districts/offices concerned, respectively.*
5. *The Researcher will make every effort obtain the goodwill and co-operation of all the GDE officials, principals, and chairpersons of the SGBs, teachers and learners involved. Persons who offer their co-operation will not receive additional remuneration from the Department while those that opt not to participate will not be penalised in any way.*
6. *Research may only be conducted after school hours so that the normal school programme is not interrupted. The Principal (if at a school) and/or Director (if at a district/head office) must be consulted about an appropriate time when the researcher/s may carry out their research at the sites that they manage.*
7. *Research may only commence from the second week of February and must be concluded before the beginning of the last quarter of the academic year. If incomplete, an amended Research Approval letter may be requested to conduct research in the following year.*
8. *Items 6 and 7 will not apply to any research effort being undertaken on behalf of the GDE. Such research will have been commissioned and be paid for by the Gauteng Department of Education.*
9. *It is the researcher's responsibility to obtain written parental consent of all learners that are expected to participate in the study.*
10. *The researcher is responsible for supplying and utilising his/her own research resources, such as stationery, photocopies, transport, faxes and telephones and should not depend on the goodwill of the institutions and/or the offices visited for supplying such resources.*
11. *The names of the GDE officials, schools, principals, parents, teachers and learners that participate in the study may not appear in the research report without the written consent of each of these individuals and/or organisations.*
12. *On completion of the study the researcher/s must supply the Director: Knowledge Management & Research with one Hard Cover bound and an electronic copy of the research.*
13. *The researcher may be expected to provide short presentations on the purpose, findings and recommendations of his/her research to both GDE officials and the schools concerned.*
14. *Should the researcher have been involved with research at a school and/or a district/head office level, the Director concerned must also be supplied with a brief summary of the purpose, findings and recommendations of the research study.*

The Gauteng Department of Education wishes you well in this important undertaking and looks forward to examining the findings of your research study.

Kind regards



Mr Gumani Enos Mukatuni
Acting CES: Education Research and Knowledge Management

DATE: 20/11/2018

Office of the Director: Education Research and Knowledge Management
7th Floor, 17 Simmonds Street, Johannesburg, 2001
Tel: (011) 355 0488
Email: Faith.Tshabalala@gauteng.gov.za
Website: www.education.gpg.gov.za

APPENDIX E

Reference: 2018/10/17/50930427/08/MC

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH AT SELECTED TSHWANE MUNICIPALITY SECONDARY SCHOOL (GRADE 9 LEARNERS)

June, 2019
Principal,
Pretoria Secondary School,
(Skinner) Sisulu Street, Islington,
Pretoria
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN YOUR SCHOOL: PRETORIA SECONDARY SCHOOL, BY ODEYEMI, BSD.STUDENTNUMBER50930427,

I am Bamidele Segun Donald Odeyemi, I am carrying out a study towards the award of a Doctoral Degree in Education at University of South Africa (UNISA) under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244. The study is titled: **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, in South Africa**
The study is aimed at finding out the factors influencing Grade 9 learners' performance in Mathematics in order to help stakeholders, policy makers, the government and parents to make better decisions on the improvement of Grade 9 learners performance in Mathematics and consequently to reduce the achievement gap. The research will make use of questionnaires and only grade 9 learners would be involved in the study
The University Ethics Committee requires a written permission on this request from your office and your assistance is highly appreciated.
My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com
Find attached the Approval from the Gauteng Department of Education and the Ethical clearance certificate from the UNISA Ethics committee
Yours faithfully,

BamIdele Segun Donald Odeyemi (RESEARCHER)

APPENDIX F

Reference: 2018/10/17/50930427/08/MC

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH AT SELECTED TSHWANE MUNICIPALITY SECONDARY SCHOOL (GRADE 9 LEARNERS)

June, 2019
Principal,
Hoerskool Centurion,
130, Selborne Ave, Lyttelton, Centurion
Pretoria
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN YOUR SCHOOL: LYTTELTON MANOR HIGH SCHOOL, BY ODEYEMI, BSD.STUDENTNUMBER50930427,

I am Bamidele Segun Donald Odeyemi, I am carrying out a study towards the award of a Doctoral Degree in Education at University of South Africa (UNISA) under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244. The study is titled: **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, in South Africa**
The study is aimed at finding out the factors influencing Grade 9 learners' performance in Mathematics in order to help stakeholders, policy makers, the government and parents to make better decisions on the improvement of Grade 9 learners performance in Mathematics and consequently to reduce the achievement gap. The research will make use of questionnaires and only grade 9 learners would be involved in the study
The University Ethics Committee requires a written permission on this request from your office and your assistance is highly appreciated.
My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com
Find attached the Approval from the Gauteng Department of Education and the Ethical clearance certificate from the UNISA Ethics committee
Yours faithfully,

BamIdele Segun Donald Odeyemi (RESEARCHER)

APPENDIX G

Reference: 2018/10/17/50930427/08/MC

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH AT SELECTED TSHWANE MUNICIPALITY SECONDARY SCHOOL (GRADE 9 LEARNERS)

June, 2019
Principal,
Thornridge Secondary School,
20, Jeugd Rd Christiaanville AH,
Pretoria
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN YOUR SCHOOL: MONTANA POORT SECONDARY SCHOOL, BY ODEYEMI, BSD.STUDENTNUMBER50930427,

I am Bamidele Segun Donald Odeyemi, I am carrying out a study towards the award of a Doctoral Degree in Education at University of South Africa (UNISA) under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244. The study is titled: **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, in South Africa**

The study is aimed at finding out the factors influencing Grade 9 learners' performance in Mathematics in order to help stakeholders, policy makers, the government and parents to make better decisions on the improvement of Grade 9 learners performance in Mathematics and consequently to reduce the achievement gap. The research will make use of questionnaires and only grade 9 learners would be involved in the study

The University Ethics Committee requires a written permission on this request from your office and your assistance is highly appreciated.

My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com

Find attached the Approval from the Gauteng Department of Education and the Ethical clearance certificate from the UNISA Ethics committee

Yours faithfully,

BamIdele Segun Donald Odeyemi (RESEARCHER)

APPENDIX H

Reference: 2018/10/17/50930427/08/MC

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH AT SELECTED TSHWANE MUNICIPALITY SECONDARY SCHOOL (GRADE 9 LEARNERS)

June, 2019
Principal,
Nellmapius Secondary School,
481, Nellmapius Road, Nellmapius Ext 1,
Pretoria
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN YOUR SCHOOL: NELLMAPIUS SECONDARY SCHOOL, BY ODEYEMI, BSD.STUDENTNUMBER50930427,

I am Bamidele Segun Donald Odeyemi, I am carrying out a study towards the award of a Doctoral Degree in Education at University of South Africa (UNISA) under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244. The study is titled: **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, in South Africa**
The study is aimed at finding out the factors influencing Grade 9 learners' performance in Mathematics in order to help stakeholders, policy makers, the government and parents to make better decisions on the improvement of Grade 9 learners performance in Mathematics and consequently to reduce the achievement gap. The research will make use of questionnaires and only grade 9 learners would be involved in the study
The University Ethics Committee requires a written permission on this request from your office and your assistance is highly appreciated.
My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com
Find attached the Approval from the Gauteng Department of Education and the Ethical clearance certificate from the UNISA Ethics committee
Yours faithfully,

BamIdele Segun Donald Odeyemi (RESEARCHER)

APPENDIX I

Reference: 2018/10/17/50930427/08/MC

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH AT SELECTED TSHWANE MUNICIPALITY SECONDARY SCHOOL (GRADE 9 LEARNERS)

June, 2019
Principal,
Prosperitus Secondary School,
330, Spitfire Avenue, Eersterust 0022,
Pretoria
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN YOUR SCHOOL: PROSPERITUS SECONDARY SCHOOL, BY ODEYEMI, BSD.STUDENTNUMBER50930427,

I am Bamidele Segun Donald Odeyemi, I am carrying out a study towards the award of a Doctoral Degree in Education at University of South Africa (UNISA) under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244. The study is titled: **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, in South Africa**
The study is aimed at finding out the factors influencing Grade 9 learners' performance in Mathematics in order to help stakeholders, policy makers, the government and parents to make better decisions on the improvement of Grade 9 learners performance in Mathematics and consequently to reduce the achievement gap. The research will make use of questionnaires and only grade 9 learners would be involved in the study
The University Ethics Committee requires a written permission on this request from your office and your assistance is highly appreciated.
My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com
Find attached the Approval from the Gauteng Department of Education and the Ethical clearance certificate from the UNISA Ethics committee
Yours faithfully,

BamIdele Segun Donald Odeyemi (RESEARCHER)

APPENDIX J

Reference: 2018/10/17/50930427/08/MC

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH AT SELECTED TSHWANE MUNICIPALITY SECONDARY SCHOOL (GRADE 9 LEARNERS)

June, 2019
Principal,
Laudium Secondary School,
220, 19th Avenue, Laudium, Centurion
Pretoria
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN YOUR SCHOOL: LAUDIUM SECONDARY SCHOOL, BY ODEYEMI, BSD.STUDENTNUMBER50930427,

I am Bamidele Segun Donald Odeyemi, I am carrying out a study towards the award of a Doctoral Degree in Education at University of South Africa (UNISA) under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244. The study is titled: **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, in South Africa**
The study is aimed at finding out the factors influencing Grade 9 learners' performance in Mathematics in order to help stakeholders, policy makers, the government and parents to make better decisions on the improvement of Grade 9 learners performance in Mathematics and consequently to reduce the achievement gap. The research will make use of questionnaires and only grade 9 learners would be involved in the study
The University Ethics Committee requires a written permission on this request from your office and your assistance is highly appreciated.
My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com
Find attached the Approval from the Gauteng Department of Education and the Ethical clearance certificate from the UNISA Ethics committee
Yours faithfully,

BamIdele Segun Donald Odeyemi (RESEARCHER)

APPENDIX K

Reference: 2018/10/17/50930427/08/MC

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH AT SELECTED TSHWANE MUNICIPALITY SECONDARY SCHOOL (GRADE 9 LEARNERS)

June, 2019
Principal,
Hillview High School,
71, Franzina Street, Roseville
Pretoria
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN YOUR SCHOOL: HILVIEW HIGH SCHOOL, BY ODEYEMI, BSD.STUDENT NUMBER50930427,

I am Bamidele Segun Donald Odeyemi, I am carrying out a study towards the award of a Doctoral Degree in Education at University of South Africa (UNISA) under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244. The study is titled: **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, in South Africa**
The study is aimed at finding out the factors influencing Grade 9 learners' performance in Mathematics in order to help stakeholders, policy makers, the government and parents to make better decisions on the improvement of Grade 9 learners performance in Mathematics and consequently to reduce the achievement gap. The research will make use of questionnaires and only grade 9 learners would be involved in the study
The University Ethics Committee requires a written permission on this request from your office and your assistance is highly appreciated.
My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com
Find attached the Approval from the Gauteng Department of Education and the Ethical clearance certificate from the UNISA Ethics committee
Yours faithfully,

BamIdele Segun Donald Odeyemi (RESEARCHER)

APPENDIX L

Reference: 2018/10/17/50930427/08/MC

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH AT SELECTED TSHWANE MUNICIPALITY SECONDARY SCHOOL (GRADE 9 LEARNERS)

June, 2019
Principal,
Langenhoven High School,
321, Servaas Street, Pretoria West
Pretoria
Dear Sir,

REQUEST FOR PERMISSION TO CONDUCT A RESEARCH IN YOUR SCHOOL: PRETORIA CENTRAL HIGH SCHOOL, BY ODEYEMI, BSD.STUDENT NUMBER50930427,

I am Bamidele Segun Donald Odeyemi, I am carrying out a study towards the award of a Doctoral Degree in Education at University of South Africa (UNISA) under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244. The study is titled: **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, in South Africa**
The study is aimed at finding out the factors influencing Grade 9 learners' performance in Mathematics in order to help stakeholders, policy makers, the government and parents to make better decisions on the improvement of Grade 9 learners performance in Mathematics and consequently to reduce the achievement gap. The research will make use of questionnaires and only grade 9 learners would be involved in the study
The University Ethics Committee requires a written permission on this request from your office and your assistance is highly appreciated.
My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com
Find attached the Approval from the Gauteng Department of Education and the Ethical clearance certificate from the UNISA Ethics committee
Yours faithfully,

BamIdele Segun Donald Odeyemi (RESEARCHER)

APPENDIX M
Reference: 2018/10/17/50930427/08/MC

INFORMED CONSENT FORM FOR PARENTS/GUARDIANS

Dear parents/guardians,

My name is Bamidele Segun Donald Odeyemi, I am a student with the University of South Africa. I am undertaking this study as part of my research for the award of Doctor of Education Degree (D.ED) in Psychology of Education, under the supervision of Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244.I am conducting a research on **Factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, South Africa.**

Procedures
The researcher requests the participation of your child/ward in this research. If you accept that they should participate, the learners will fill a questionnaire after school hours for the period of 30 minutes to collect quantitative data necessary for factors influencing Grade 9 learners Mathematics performance in Tshwane municipality with the prior approval of the school authority. The participants are 50 learners from each school selected from the 8 selected schools in the sample. Your consent is highly important. Your children/wards participation in this research is completely voluntary so that they can terminate their involvement at any time, regardless of the fact that you would have consented to their participation. Their identities will not be disclosed and all the information to be provided will be held in strict confidence and with utmost privacy. They may decline to answer any question if they feel uncomfortable and they do not have to provide me with a reason for refusing to answer any question. If they decide not to be part of the study, there will be no consequences for that. There is no right or wrong answer to any question. The study does not anticipate any risk to them.

Privacy and confidentiality
Learners' privacy and confidentiality shall be strictly ensured. Learners names shall not be recorded, but codes will be used instead. These forms will only be in my possession and will never be used in any research output.

Benefits
There are no direct benefits from this study, but your children/wards' participation will help us find out the factors influencing academic performance of Grade 9 learners in Mathematics in Tshwane municipality, South Africa.
The information generated from the questionnaire will help us in finding out ways of improving Grade 9 learners' academic performance in Mathematics.

In case you have any question about this study, such question(s) may be asked from me or my supervisor: **Prof., Regis Chireshe, from the Department of Special Needs Education at Great Zimbabwe University and can be contacted on +263777308244.**
My contact details are: +2347036310487/+2348025021182 email: bsd102002@yahoo.com
and if there are no questions and you have agreed to allow your children/wards to participate in the study, I will request that you sign this form, stating that the researcher has informed you of your child/ward rights and that you have agreed that he or she should participate in the study.
Parent/guardian's Statement
The study has been explained to me. I have been given a chance to ask questions which I may have and I am content with the answers to all my questions. I also know that; my child/wards' records will be kept private and confidential; my child/ward can choose not to answer certain questions or withdraw from the study at any time. I give consent

that my child/ward can participate in the study. I understand that 49 other children will be analysed together with my child/ward and reported on as findings of the study.

Date: _____

Name of Child/ward: _____

Signature and name of Parent/guardian: _____

The researcher's statement

I Bamidele Segun Donald Odeyemi, the undersigned, have defined and explained to the parent/guardian in a language that he/she understands, the procedure to be followed and the risks and benefits involved and the obligations of the study.

Date: _____

Name of Researcher: _____

Signature of Researcher: _____

APPENDIX N
Reference: 2018/10/17/50930427/08/MC

CONSENT TO PARTICIPATE IN THIS STUDY (Return slip)

I, _____, confirm that the person asking my child/ward consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to allow my child/ward participate in the study.

I understand that the participation of my child/ward is voluntary and he/she is free to withdraw at any time without penalty (if applicable).

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my child/ward's participation will be kept confidential unless otherwise specified.

I have received a signed copy of the informed consent agreement.

Parent/guardian Name & Surname (please print) _____

---------- ----------

Participant Signature Date

Researcher's Name & Surname (please print)

Bamidele Segun Donald Odeyemi

_____ _____

Researcher's signature Date

My contact details are: **++2347036310487/+2348025021182 email: bsd102002@yahoo.**com

and my supervisor can be reached at the Department of Special Needs Education (Great Zimbabwe University)**+263777308244**, e-mail: **chireshe@yahoo.co.uk**.

PRETORIA SECONDARY SCHOOL

PO BOX 27435
SUNNYSIDE
0132

TEL: 012322 9943/7/8
Pretoria central
EMAIL: admin@ptasec.co.za

Cnr: NANA SITA & SISULU

To: whom it may concern.

Research Project

This is to certify that Mr BSD Adeyemi was here in our school to conduct his research for Maths Grade 9. He is a student at UNISA. The research went well as the learners were participating in the project. It was very fruitful for the learners.

Yours faithfully

Mr. TT Mudau

Gauteng Department of Education
PRETORIA
SECONDARY SCHOOL
OFFICIAL

APPENDIX P

HOËRSKOOL CENTURION

SELBOURNELAAN, LYTTELTON, CENTURION. GPS: GPS: S 25° 49' 48.3" / E 28° 11' 57.0"
TEL: (012) 664 5803 FAKS: (012) 664 7969 INFO@HSCENTURION.CO.ZA WWW.HSCENTURION.CO.ZA

16 August 2019

Centurion High School
P.O. Box 14054
LYTTELTON
0140

TO WHOM IT MAY CONCERN

This is to confirm that Mr BSD Odeyemi, Student number 50930427, was at Hoërskool Centurion on 16 August 2019, to collect the research forms from the school, completed by the learners.

Yours faithfully

H.J. KOEKEMOER
PRINCIPAL

GAUTENG DEPT. ONDERWYS
AMPTELIK / OFFICIAL
16 AUG 2019
DIE HOËRSKOOL CENTURION
GAUTENG DEPT. EDUCATION

THORNRIDGE SECONDARY SCHOOL

THORNRIDGE SECONDARY SCHOOL

CNR DR SWANEPOEL ROAD & JEUGD ROAD
CHRISTIAANVILLE AH MONTANA PRETORIA

(081)3455800
082 600 7390
086 539 0826
E-mail: hsmontanapoort@gmail.com

DISTRICT: TSHWANE NORTH

Enquiries: Baloyi N.B

EMIS No.: 700400798

08 August 2019

TO WHOM IT MAY CONCERN

This is to confirm that Mr BSD Odeyemi, Student number 50930427, was at Thornridge Secondary School on 08 August 2019, to collect the research forms from the school, completed by the learners.

Yours Faithfully

Mr KY Binu
Grade 9 HOD

THORNRIDGE SECONDARY SCHOOL
E-mail: hsmontana@gmail.com
2019 -08- 08
Plot 20 Agricultural Holdings
Christiaanville Montana
TSHWANE NORTH DISTRICT (D3)

GAUTENG PROVINCE

ADDRESS ALL CORRESPONDENCE TO THE PRINCIPAL

APPENDIX R

education
Department: Education
GAUTENG PROVINCE

NELLMAPIUS SECONDARY SCHOOL

5552 NELLMAPIUS ROAD
KWANANDUMO STREET EXT 2
0162
EMIS NO: 700400088
Email: nellmapiushighschool@yahoo.com

P.O.BOX 1730
SILVERTON
0127
MOBILE: 082 557 1687

Dear Sir/Madam

This is to confirm that Mr. B.S.D. Odeyemi, Student number 50930427 has been given permission by the above-mentioned school, to conduct a research on the "Factors influencing municipality Grade 09 learners' performance in Mathematics, South Africa".

Maudu
Maths Head (Maudu LM)

06 August 2019
Date

NELLMAPIUS SECONDARY SCHOOL
OFFICE OF THE PRINCIPAL
082 557 1687
06 AUG 2019
P.O BOX 1730 SILVERTON 0127
5903 KWANADUMO RD NELLMAPIUS EXT 2 0162

Principal: Moloi PN, Deputy Principal: Beauchamp HN, Deputy Principal: Dzumba J, HOD Languages: Maleka EM, HOD Social Sciences: Nhlapo F, HOD Commercials: Nkoane, HOD Services: Kubjane P.B., Mathematics and Mathematical Literacy: Maudu L.M.

APPENDIX S

PROSPERITUS Secondary Sekondêr

PO Box / Posbus 41166, Eersterust, 0022
Tel: (012) 806-8769 Fax / Faks: (012) 806-9006
E-mail / E-Pos: info@prosperitus.co.za

06 AUGUST 2019

PROSPERITUS SECONDARY SCHOOL
330 SPITFIRE AVENUE
EERSTERUST
PRETORIA
0022

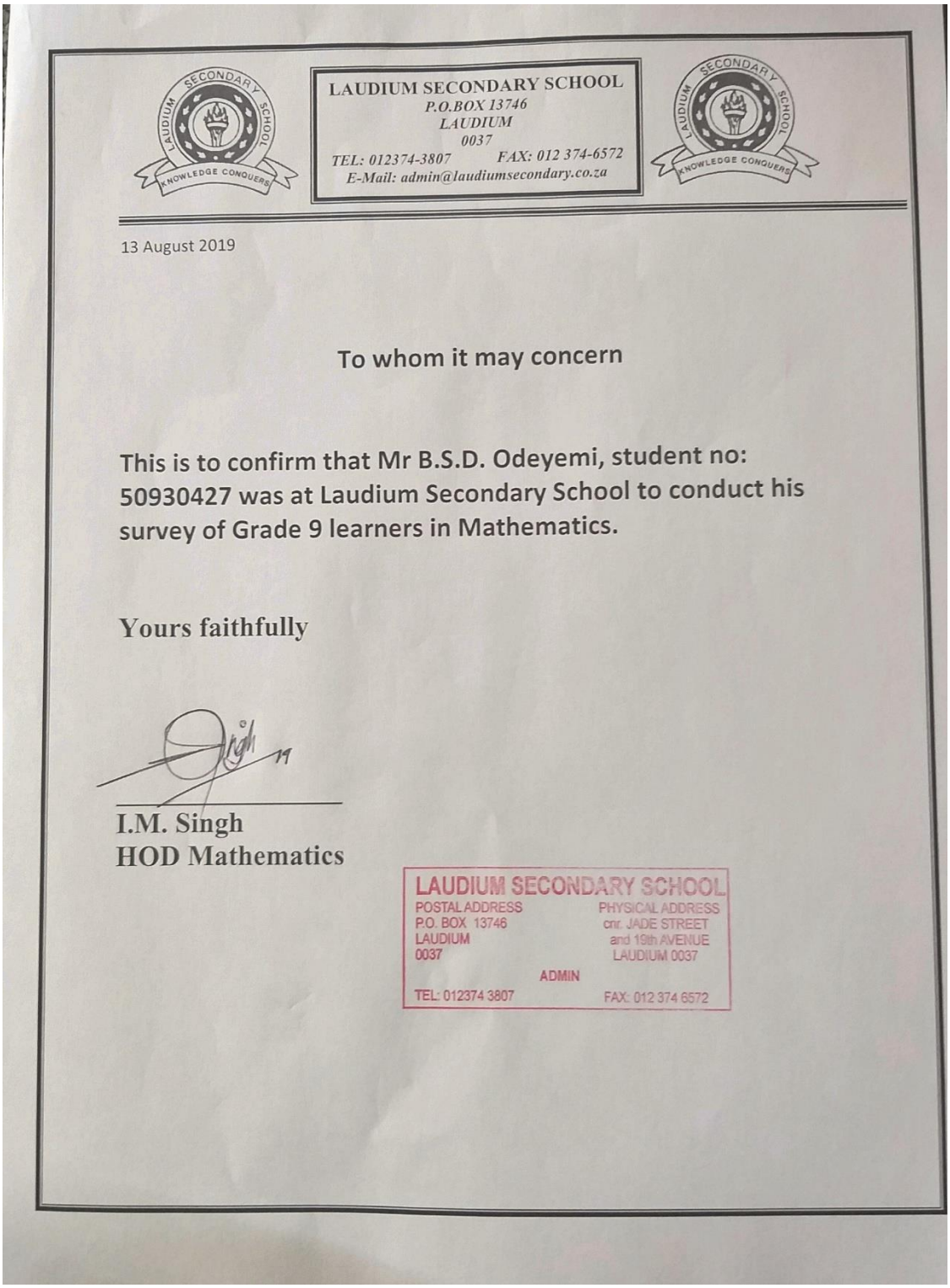
TO WHOM IT MAY CONCERN

This is to confirm that Mr BSD Odeyemi, Student number 50930427, was at Prosperitus Secondary School on 06 August 2019, to collect the research forms from the school, completed by the learners.

Yours Faithfully

Mrs.R.Masebenza
Grade 9 Grade Head

GAUTENG DEPARTMENT OF EDUCATION
PROSPERITUS SEKONDERE SKOOL
PROSPERITUS SECONDARY SCHOOL
2019 -08- 06
P.O. BOX 41166 EERSTERUST 0022
TEL: (012) 806 8769
GAUTENG DEPARTMENT OF EDUCATION



LAUDIUM SECONDARY SCHOOL
P.O.BOX 13746
LAUDIUM
0037
TEL: 012374-3807 FAX: 012 374-6572
E-Mail: admin@laudiumsecondary.co.za

13 August 2019

To whom it may concern

This is to confirm that Mr B.S.D. Odeyemi, student no: 50930427 was at Laudium Secondary School to conduct his survey of Grade 9 learners in Mathematics.

Yours faithfully

I.M. Singh
HOD Mathematics

LAUDIUM SECONDARY SCHOOL
POSTAL ADDRESS
P.O. BOX 13746
LAUDIUM
0037
PHYSICAL ADDRESS
cnr. JADE STREET
and 19th AVENUE
LAUDIUM 0037
ADMIN
TEL: 012374 3807
FAX: 012 374 6572

APPENDIX: U

Tel ☎ : (012) 335-2271
Fax : (012) 335-6018

e-mail : hillview@hillviewhigh.co.za

PRINCIPAL: DR MM PHALANE

HILLVIEW HIGH SCHOOL
71 Franzina Street
ROSEVILLE
Pretoria
0084
✉ P O Box 30156
WONDERBOOM POORT, 0033

12/08/2019

TO WHOM IT MAY CONCERN

This Letter serves to confirm that Mr BS Odeyemi , Student at UNISA was at Hillview High School to collect data for Mathematics.

Phalane

DR PHALANE (PRINCIPAL)

HILLVIEW HIGH SCHOOL
P.O. BOX 30156
WONDERBOOMPOORT 0033
2019 -08- 12
GAUTENG DEPARTMENT OF EDUCATION

APPENDIX: V

Langenhoven High School

Langenhoven High School
Private Bag x 19
GEZINA
0031

2 August 2019

TO WHOM IT MAY CONCERN

This is to confirm that Mr BSD Odeyemi, Student number 50930427, was at Langenhoven High School on 2 August 2019, to collect the research forms from the school, completed by the learners.

Yours faithfully

pp _____
C O'NEIL
PRINCIPAL

Hoërskool Langenhoven
P/Sak X19
Gezina
0031

Private Bag x19, Gezina, 0031. Phone: 012 3283466. Fax: 012 325 8731
E-mail: hslangenhoven@telkomsa.net Website: www.diehslangenhoven.co.za
Fundraising number: 021-816-NPO

APPENDIX W: GRADE 9 LEARNERS' TEST-RETEST SCORE

S/N	X	Y	X^2	Y^2	XY
1	127	130	16129	16900	16510
2	153	151	23409	22801	23103
3	140	144	19600	20736	20160
4	149	142	22201	20164	21158
5	119	123	14161	15129	14637
6	158	154	24964	25716	24332
7	144	147	20736	21609	21168
8	132	136	17424	18496	17952
9	118	122	13924	14884	14396
10	158	156	24964	24336	24648
11	130	136	16900	18496	17680
12	135	130	18225	16900	17550
13	137	132	18769	17424	18084
14	128	130	16384	16900	16640
15	148	144	21904	20736	21312
16	147	143	21609	20449	21021
17	128	131	16384	17161	16768
18	140	143	19600	20499	20020
19	132	136	17424	18496	17952
20	135	132	18225	17424	17820
21	126	130	15876	16900	16380
22	152	150	23104	22500	22800
23	139	143	19321	20449	19877
24	148	140	21900	19600	20720
25	118	121	13924	14641	14278
26	157	153	24649	23409	24021
27	130	135	16900	18225	17550
28	116	120	13456	14400	13920
29	126	128	15876	16384	16128
30	149	151	22201	22801	22499
31	137	140	18169	19600	19180
32	145	142	21025	20184	20590
33	115	118	13225	13924	13570
34	153	150	23409	22500	22950
35	141	146	19881	21316	20586
36	130	134	16900	17956	17420
37	114	116	12996	13456	13224
38	151	155	22801	24025	23405
39	129	133	16641	17689	17157
40	132	128	17424	16384	16896
41	134	133	17956	17689	17822
42	126	132	15876	17424	16632
43	144	146	20736	21316	21024
44	143	141	20449	19881	20163
45	150	157	22500	24649	23550
46	143	139	20449	19321	19877
47	121	118	14641	13924	14278
48	120	116	14400	13456	13920
49	144	140	20736	19600	20160
50	145	149	21025	22201	21605
TOTAL	**6836**	**6867**	**941986**	**948990**	**945093**

Pearson product correlation of (r) r

N = 6836, ∑X = 6836, ∑Y = 6867, $\sum X^2$ = 941986, $\sum Y^2$ = 948990, ∑XY = 945093

$$r = \frac{N\sum XY - \sum X \sum Y}{N\sum X^2 - (\sum X)^2 \; N\sum Y^2 - (\sum Y)^2}$$

$$= \frac{50(945093) - (6836)(6867)}{50(941986) - (6836)^2 \; 50(948990) - (6867)^2}$$

$$= \frac{47254650 - 46942812}{(47099300 - 46730896)\{47449500 - 47155689)}$$

$$= \frac{311838}{368404 \times 293811}$$

r= 0.947

r= 0.95